Management Services in Government

August 1980 Volume 35 Number 3

Management Services in Government

Vol 35 No 3 **August 1980**

Produced by the Civil Service Department Management Group,
in collaboration with Departmental Management Services Officers

London: Her Majesty's Stationery Office.

© Crown copyright 1980
First published 1980

ISBN 0 11 722075 2
ISSN 0307-8558

Communications about the contents of *Management Services in Government* should be addressed to the Editor at the Civil Service Department, Old Admiralty Building, Whitehall, London SW1A 2AZ.

Communications concerning subscriptions and sales should be addressed to Her Majesty's Stationery Office, PO Box 569, London SE1 9NH, or any of the bookshops listed on the cover.

BACKFILE VOLUMES
Complete volumes of this journal are available on microfilm from Xerox University Microfilms, 300 North Zaeb Road, Ann Arbor, Michigan 48106, USA.

Management Services in Government
August 1980 Volume 35 Number 3

Contents

Page

117 The Civil Servant as Policy Adviser
R W L Wilding, CB

123 Medical Research in the Civil Service
A M Semmence, P J Constable and V C Medvei, CBE

129 The Management Aim of a Government Department
S D Walker, CBE

136 The Council of Civil Service Unions
P D Jones

141 Introducing Change in the Employment Benefit Service
L Lewis

149 Analysing Personal Names
J Travers

155 The Management of ADP Standards

161 Management Bookshelf
Miss F Cullen

164 New CSD Publications

166 Letter to the Editor

168 Corrigendum

Supplement
Computer Installations for Government Departments

The Civil Servant as Policy Adviser

R W L WILDING, CB, Civil Service Department

Richard Wilding is the Deputy Secretary in charge of the Management Group of Divisions of the CSD. This article is based on a lecture he gave at the London School of Economics and Political Science, and expresses his personal views.—*Editor.*

It no longer goes without saying that the interests of the country are best served by a permanent and non-political civil service giving objective advice and working under the close supervision of the Government of the day. Critics have suggested that the Civil Service cannot be non-political and that the advice it gives cannot be objective. The question is very important for the constitutional role of the Civil Service as we have known it in this country for the last 100 years, and I should like to offer some reflections on it on an entirely personal basis.

Some semantic points

The trouble arises over the words 'non-political' and 'objective'. Is there just a semantic misunderstanding here or is there a question of substance at stake? At one level, it looks semantic; perhaps if one substituted 'non-party' for 'non-political', everyone would find themselves in agreement. But I suspect that the misunderstanding—for that is what I think it is—goes deeper than that.

Let us first define the Civil Service activity we are talking about a bit more narrowly. Eighty-ninety per cent of civil servants are engaged in administering legislation and otherwise executing Government policy—running the defence programme, collecting taxes, delivering social services, running prisons and so on. Even here, no doubt, the description of the work as 'non-political' has to be qualified. Any action by a civil servant can *become* a political matter if it annoys enough people and causes a row. It does so simply and solely by virtue of the fact that it is done by the Minister's servant; the Minister has to answer for it in Parliament and the Government can be damaged if he cannot answer convincingly. And of course quite a lot of this work, the delivery of social security benefits for example, is, of its very nature, politically sensitive stuff. It matters to politicians, and quite rightly, if pensions or sickness benefits are not paid accurately and quickly. So there is a political aspect, or at least a *potential* political aspect, to almost everything we do. But that is not really what worries the critics. I do not think many people believe that civil servants work more conscientiously for one Government than another, or that they con-

sciously frustrate the wishes of Ministers in the way they do it. What concerns the critics is the activity at headquarters, and specifically the activity of preparing issues for decision and giving policy advice.

In purely linguistic terms, I have a certain sympathy with the critics. It would not be silly to say that this is a highly political job and the civil servants who give policy advice to Ministers have to become highly political animals. But this is to use the word 'political' in a particular sense; it is very important to be clear about it—and about what civil servants do and what they don't do. To put the point in its simplest form—and I know this runs the risk of oversimplifying it—civil servants do not say to ministers 'you *can't* do this', except when they are telling them that they have no legal powers to do it and had better get Parliament to grant them. Mostly they do not even say 'you *shouldn't* do this'. In a few cases, they do—most often, I think, on the professional side in cases where professional standards are concerned. Thus a medical adviser may well feel it his duty to say 'you should do so-and-so' if so-and-so is a necessary precaution against, let us say, the risk of letting dogs with rabies into the country; or an engineer may say 'you should not do such-and-such' if such-and-such means a dangerous weakening of the construction of bridges or blocks of flats. Everybody would agree that this is right, and part of the duty of an adviser in the professional or technical field. But what the administrator typically says is something different. He says 'you can do this: but if you do, X, Y and Z will be the consequences; and if you want to avoid X and mitigate Z, my recommendation is to modify this and make it a bit more like that'. That is to say, his job is essentially to lay out options, to expose the consequences and implications of those options as thoroughly and objectively as he can—and then to leave it to Ministers to decide between them. That is what I think is usually meant by a non-political civil service giving objective advice.

Let me spend one minute more on the meaning of the word 'objective'. It does not mean quite the same as 'impartial'. The civil servant is not impartial as between the Government and the Opposition (though there is a sense in which he is impartial as between the present Government and the next Government). He is the servant of the Government of the day, he is loyal to it, and his interest is that the Government should govern successfully—should tackle what it decides to do in such a way that it achieves its objectives. That is where his professional satisfaction lies and it is a necessary condition of his own success in winning and keeping the confidence of his Minister. Hence it follows also that 'objective' does not mean quite the same as 'detached'; the civil servant cannot be wholly indifferent to the outcome of the decisions to which he has contributed advice. Moreover, if his advice is to be based on knowledge, he has to get to know the subject-matter, and it is unlikely that this will result in his having no opinions of his own. His obligation to give objective advice has, in my view, a dual meaning. First, that he must do his professional best to

discipline his own opinions and biases, so that he does not stack the cards in presenting the available options to ministers, and secondly that the subject-matter of his advice must itself be objective, in the sense of being about facts. He must cover the relevant facts properly and, where (as often) judgement must enter in, he must base his judgement on fact to the greatest extent that he can—and show how far he has been able to do so.

Options and recommendations

I do not mean that civil servants only set out the options and conscientiously refrain from ending with a recommendation. They would be failing in their duty if they did not often follow through and recommend what seemed to them the best course for the Minister to take; and few if any Ministers would wish to be served by indecisive eunuchs. In practical terms moreover precious time would be wasted if officials always awaited the decision before they submitted the draft letter which gave effect to it or recommended some other appropriate follow-up action. But before he reached his recommendation, the civil servant, if he is doing his job properly, will set out all the options that are available and, so far as he can, the consequences of each.

Let us take it a bit further. What sort of consequences are we talking about? Not, for the most part, direct political consequences like 'if you do this, there will be a fearful row on the backbenches'. Though civil servants may occasionally remind their Ministers of such points, it is for Ministers to make their own assessments of the ground they know best. But every subject has its own set of politics with a small 'p': the attitudes which the individuals and bodies concerned with it have taken up, the history of earlier attempts to put through some given change—in short, what people have shown they can be persuaded to do in a particular field and what they have shown they probably can't. And it is relevant here to observe that as in the past the scope of the Government's involvement in the life of the country got wider and wider, the more the Government had to rely on the willingness of people who were not its employees to do what it wanted done.

The likelihood or unlikelihood that people who are not employed by the central government will actually do what Ministers will want them to do is therefore one of the considerations that advice on policy has to cover. There are at least five more:

(*a*) Whether the action proposed—if fully carried out by all concerned—will have the effect it is intended to have. Will this proposal for improving legal aid or supplementary benefits actually result in more poor people applying for and receiving help? Will that definition of eligibility for attendance allowance actually embrace the cases the Government wishes to help—or is it so narrow that the chief consequence will be a host of disappointed claimants? Will this or that tax concession be the more effective in stimulating the economy without causing a flood of imports? And

what, if any, will be the effect of any of these measures on some quite different field of policy-making?

(*b*) What each of the possible options will cost, in both money and skilled manpower and in the use of other scarce resources. Commonly, this is not a matter of reporting facts but of scrutinising estimates and aiming off for the optimism which all too often characterises promoters of favourite schemes.

(*c*) Repercussions. 'Repercussion' is a bureaucratic word, easily fastened upon to caricature bureaucratic caution and conservatism. It is however an essential element in policy advice. It is often true that some particular proposal would be a splendid thing to do if only you could seal it off from everything else, but appears in a very different light when you consider the other claims it would stimulate or the defences it would undermine. There is a close connection between this aspect of policy advice and the principle of even-handedness—that any Government must, within reasonable tolerances, treat all groups of citizens equitably. Thus, for example, after the Finer Committee on One-parent Families had reported in favour of additional monetary benefits for single parents there was a long argument about whether this could be fenced off in such a way that it would not immediately give rise to demands on behalf of other poor families. The children of the sick and the children of the unemployed have the same needs, in physical terms, as the children of the single parent. Would it be just, and for how long would it be practicable, to provide extra money for the one without doing so for the others?

(*d*) The practicability and simplicity of administration. This covers not only the numbers of civil servants you need to administer a given scheme, with the buildings and computers they will need, and the paper they will consume, but also the burden which that extra slice of administration will put on the citizen—the person who has to pay the tax, apply for the benefit or make the statistical return. When people talk of the country being over-governed, this is a big part of what they mean, and this is a field in which apparently simple proposals can well be deceptive. For example when we first became conscious of the energy crisis a number of people suggested a penal tax on particularly wasteful forms of heating, especially the ubiquitous electric fire. In itself, this is a practicable measure. It was the task of the administrator to draw on his weary experience and point out the hosts of exemptions that would have to be granted to the elderly, the sick and the very young for whom an electric fire was the only present available means of heating, and the enormous bureaucratic apparatus of licences, appeal tribunals and so on that would be involved.

(*e*) Last in this list—not that it is anywhere near exhaustive—come international constraints, especially since we became members

of the EEC. How will foreign governments react? If it were done a bit differently, could they be brought to acquiesce?

Changes in policy

It is worth remembering in all this that the proportion of policy decisions that represent changes in, or additions to, an existing policy is high, and that the proportion that are completely new—written, as it were, on a virgin sheet of paper—is relatively low. There are of course some cases which fall into the second category, when Ministers find it necessary to formulate a policy on some matter where there was no, or next to no, policy before. But much more numerous are the cases in which there is an existing policy and the issue is about changing it. The impetus for change may arise because Ministers wish to change the objectives of the policy. Or it may arise because there is reason to doubt whether the objectives of the policy are in fact being met or whether they could not be met in a more economical way. In either case, it is highly desirable that advice on changing the policy should be available from those who have had the responsibility for administering it. They will know where the shoe pinches and where the costs arise, and they will be likely to have a better idea than anybody else where the pinches and the costs are likely to arise if Mark II or Mark IIA of the policy is substituted for Mark I. This is not by any means to say that those who administer the present policy should be the *sole* source of advice about changing it. But I have no doubt that the link between policy and execution is so close that their contribution is essential.

We should also remember that a great deal of policy advice is generated not by the deliberate maturing of the Government's thinking about its social, economic or defence policy but by external events which have not been foreseen and to which the Government has to react quickly. Sudden turns in the course of economic affairs abroad—political upheavals in other countries, a prolonged drought, a serious spillage of oil off the coast of Cornwall—are possible examples. The question is then: how can we cope with the situation thus created? Can it be done within existing policies and existing plans for expenditure? If not, in what way, and how far, must those policies and plans be modified? What will that mean in turn for other policies and other plans? Expedients have to be improvised in a hurry, but in such a way as to minimise the extent to which the Government is thrown off course. The machine then has to work very quickly, and this again demands skill and experience in making it do so.

In such cases, obviously enough, the process of giving policy advice is hurried and is apt to be flawed. More generally, indeed, it would be wrong to allow this analysis of policy advice to create the impression of a steady, deliberate, exhaustive process which, time and time again, provides a model of administrative procedure. Life is not often like that. Advisers on policy are often working against time on problems where facts are in short supply, the opportunities for consultation are

constrained and civil servants must simply do the best they can. The picture I am trying to give therefore is not one in which all the elements are always fully covered and fully documented with supporting fact—or, it may well be, in which all the possible options have in fact been thought of. I am setting out what we try to do, not what we always succeed in doing.

Some inferences and conclusions

This partial attempt at an analysis of policy advice seems to me to lead pretty plainly to a number of inferences:

(*a*) these are all matters on which it is *possible* to give objective advice;

(*b*) they are all matters on which Ministers *need* objective advice; they cannot possibly be self-sufficient over the whole of this range;

(*c*) they call for a lot of experience and deep immersion in the subject-matter;

(*d*) the majority of them need experience of executing policy as well as of advising on it.

These inferences seem to me to point strongly to two conclusions. The first is that providing objective advice on policy which takes full account of all the factors I have mentioned, including those of cost and administrative practicability, is a highly professional skill which cannot be acquired without time, labour, training and intelligent application. The business of recruiting and training those who are to do this work is therefore a matter of considerable public importance. Secondly, I think the country will continue to need a permanent civil service, not only for the execution of policy decisions but also to provide Ministers with the kind of advice I have attempted to outline. The need for a professional skill which can only be built up over time, and the continuity between policy and execution, combine to make this inference clear.

This analysis does not of course lead to the conclusion that the permanent civil service should have any monopoly of policy advice. I do not think the Civil Service has ever claimed that; it certainly does not claim it now. Ministers will wish to receive advice from standing or *ad hoc* advisory committees, from academics and from the bodies representing the interests which will be affected by their decisions. And they will wish to have an open and active line of communication with their backbenchers and their political parties, whether through special advisers or by any other means. We have now entered the age of widespread and lengthy consultation; we pay a price for it in loss of speed and dilution of decision; but this is now unmistakeably the world we live in. The conclusion I have suggested is not in conflict with this development; it simply means that one essential and central strand in the advice given to Ministers should continue to be given by their permanent civil servants.

Medical Research in the Civil Service

A M SEMMENCE; P J CONSTABLE; and V C MEDVEI, CBE

Dr Semmence is the Medical Adviser, Civil Service Department, and Dr Constable is his deputy; Dr Medvei was formerly Principal Medical Officer, Treasury Medical Service.—*Editor.*

Professor Geoffrey Rose in the 1978/79 report of the London School of Hygiene and Tropical Medicine mentioned that the Whitehall Study of Civil Servants, which is described later in this article, unexpectedly uncovered—and it was probably its most important finding—the existence of astonishing differences in the risk of fatal heart attacks between men in different employment grades. The difference is in the same direction as was seen in the national trends but is much larger. Men in the lowest grades had a mortality from coronary heart disease 3·6 times that of men in the top. He went on to say that evidently it is possible to be westernised and affluent and yet still have a relatively low coronary risk. 'Some of the intergrade differences in heart attack rates can be accounted for by differences in smoking and in the blood pressure level recorded at survey; but about a half remains unexplained. There are many unanswered questions, and these will form a major subject for research in the next few years. For example, are the social classes (and the Civil Service grades) genetically different? . . . Top-grade civil servants are on average much taller (and tallness is associated with a lower risk of heart attack): does this reflect the genes, or their childhood nutrition? Among contemporary differences we need to study, and to develop methods of measuring, is "stress" of various kinds. . . . We have a major phenomenon demanding explanation, and no doubt one or more major determinants of this disease still await identification. We hope that we shall discover something relevant to the wider problem of the national differences between the social classes.'

Cardiovascular disease is the commonest single cause of premature death and morbidity in men in western society. In the non-industrial civil service we expect nearly 700 of the annual 2,000 male deaths in service to be due to coronary heart disease, and over 100 of the female deaths. In 1978 over 300 men and 150 women retired prematurely because of cardiovascular disease out of a total of 2,500 medical retirements. Identification of factors responsible for this enormous human and economic loss is of profound interest to a medical service charged with the health surveillance of civil servants. The structure of the Civil Service in which grades are more likely to be homogeneous

than the social classes outside; the co-operation of well-motivated and interested people and the diversity of the occupations they follow make the Civil Service a suitable population for study. This paper describes the background to current research in groups of civil servants.

Historical background

Medical supervision of the health of civil servants goes back to 1723 when Mr Bamber, a surgeon of Mincing Lane, was appointed part-time by the Board of Control of the Excise Department to tend excise men of London. A full-time medical officer was appointed in 1813. By 1855 medical officers had been appointed to the Post Office and Treasury.

Sir Henry Bashford, the Chief Medical Officer of the Post Office, was appointed first Treasury Medical Adviser in 1948 and combined the new Treasury Medical Service with the old established Post Office Medical Service. Access to a 'captive population' of more than half-a-million working people of both sexes between the ages of 16 and 65 give opportunities for studies in social medicine on an even greater scale than those previously carried out by the Post Office Medical Service, especially as this captive population included representatives of the majority of occupations in Great Britain, even sailors and barmaids. The Treasury Medical Service became responsible for the medical services of several departments such as the Board of Inland Revenue, the Colonial Office, the Ministry for Civil Aviation, the Defence Ministry and the Ministry of Supply which already had their own medical advisers.

Sir Henry Bashford's research activities were continued by his successor, Sir Walter Chiesman. In the 1950s the Medical Research Council carried out a large-scale investigation into the prevention of the common cold using an experimental vaccine, and a centre was set up adjoining the first-aid post in the Treasury to see and treat, in agreement with their general practitioners, volunteer civil servants within the Whitehall area who developed a common cold.

These studies demonstrated the need for further research into the causes of excessive sickness absence in the civil service. Chronic bronchitis was a major cause, Post Offices with a large proportion of middle-aged postmen on their staff being particularly affected. Chronic bronchitis had also been found to be a major problem in rehabilitating the disabled. Dr Medvei, the Principal Medical Officer in the Treasury Medical Service and previously Medical Officer in charge of the London Postal Region, and Dr Neville Oswald, consultant physician to the Brompton and St Bartholomew's Hospitals, instituted a major study under the auspices of the Medical Research Council, the Brompton Hospital and the Treasury Medical Service. The investigation, study and treatment of some 3,000 civil servants in the Greater London area suffering from recurrent attacks of bronchitis

was continued for over 20 years and major contributions to medical research were made.*

In 1953 an attempt was made by the Brompton team to introduce a simplified short questionnaire to discover a tendency to chronic bronchitis and over 3,500 men and some 2,500 women working in departments in central London helped in its development. Answers to a question from Dr Medvei, 'Have you ever smoked five or more cigarettes a day for five or more years?' showed that the proportion of people having respiratory symptoms was significantly higher among smokers than among non-smokers. These findings, reported to the Bronchitis Committee of the Medical Research Council, led eventually to the identification of risks associated with cigarette smoking. The effects of air pollution on postal workers in London main railway stations—Victoria and Waterloo with their electrified system, and Liverpool Street with its steam trains—was also studied.

A study of Foreign and Commonwealth Office personnel in conjunction with the London School of Hygiene and Tropical Medicine on the development of raised blood pressure in male serving officers in the late 1950s fostered links with the London School which were greatly strengthened by Sir Walter Chiesman's successors, Sir Daniel Thomson and Dr Blair Harrington, and led to the organisation of large-scale studies which are described below.

The Whitehall Study

The Whitehall Study, financed by the London School of Hygiene and Tropical Medicine, set out in 1968 to ascertain factors which predict coronary heart disease in male civil servants; 18,403 men aged 40-64 in Whitehall departments who completed a questionnaire were medically examined and follow-up continues. Research publications from the study have demonstrated the association of cigarette smoking, raised blood pressure and raised blood glucose with an increased risk of premature death from coronary heart disease. Research on diabetes in the Whitehall Study has shown the need to review the criteria for its diagnosis—there is evidence that in general diabetes has been diagnosed too readily.*

The Leisure Activity Study

The Leisure Activity Study, financed by the Medical Research Council and undertaken by Professor J N Morris and his colleagues in the London School of Hygiene and Tropical Medicine, also set out to ascertain predictive factors in coronary heart disease and the place of exercise in its prevention. In the first round of the enquiry 70,000 male Executive Officers aged 40-60 from MAFF, Department of the Environment, Department of Employment, DES, DHSS and Inland Revenue provided a five-minute by five-minute record of how they

* See note at the end of this paper.

spent two unannounced sample days. These men have been followed up since and a sub-sample of 509 men living in 12 towns in early 1970 was visited and examined by a doctor and nurse. In the second round the questionnaire was sent in October 1976 to 15,000 Executive Officers in the DHSS and Inland Revenue who were born before 1931, three-quarters of whom participated in the first round in 1968/71.

Previous reports by Professor Morris and his co-workers have shown that a man's total physical activity does not seem to have any protective effect against heart disease. What does is bursts of vigorous excercise such as swimming, tennis, hill climbing, keep-fit exercise, heavy digging, sawing logs, concreting and the like. The results of a 20 per cent sample of the 18,000 Executive Officers have been analysed and of the 3,591 men concerned 268 died up to the end of 1977. Only 1 per cent of men who reported vigorous exercise during the study week-end have died of coronary heart disease compared with 4·3 per cent of the men who did not. This drop in death rate was not accompanied by a rise in any other cause of death such as cancer or other disorders.

The vigorous activity group tended to smoke rather less than the other groups but the effects of the two factors were largely independent, so that men who took adequate exercise and did not smoke had low coronary rates indeed. There was no evidence that it was because some men were already suffering from heart disease (and therefore more likely to die of it) and did not undertake vigorous exercise during the study week-end, that these differences in experiencing heart disease occurred.*

Following the success of these two surveys the Medical Advisory Service decided to enlarge the scope of its screening activities. Research into the major causes of premature death and disability in the civil service was still the main reason but, in addition, the feasibility of extending screening throughout the civil service was investigated and civil service women were asked to participate. These were the origins of the London Survey.

The London Survey

Between July 1975 and December 1978, 53,600 questionnaires were despatched to male and female civil servants aged between 35 and 55 working in London. Fifty-six per cent of them were returned and as a result 5,300 men and women were asked to attend for examination in Tilbury House. Review of the results so far has tended to diminish our initial enthusiasm for large-scale screening; it may be that analysis will show what other surveys in London, Yugoslavia and the United States have suggested, that people who are screened do not benefit in terms of hospital admissions, days spent in hospital or mortality over a long period of observation following screening. In fact the only unequivocally useful result of the London Survey so far is finding

* See note at the end of this paper.

undiagnosed hypertension in middle-aged men. Even here we believe, as some other workers do, that the doctors responsible for treating hypertension, the general practitioner or the consultant, should be responsible for screening. Screening for high blood pressure at place of work has many drawbacks, which we are investigating further in a study of hypertension in Inland Revenue staff at Cardiff together with consultants from the hospital there.

Although screening may be temporarily under a cloud, the continuing value of civil service surveys to medical research is unquestioned; a follow-up study of the major differences in coronary heart disease in the various grades of the civil service taking part in the Department of the Environment Study and financed by the British Heart Foundation, was referred to by Professor Rose in the opening paragraph of this paper.*

One of the by-products of the London Survey and of the other screening activities in which the Medical Advisory Service is engaged is a review of alcohol intake linked with measurements of liver function. Professor Tom Whitehead of Birmingham University hopes to identify those individuals for whom alcohol abuse is especially harmful and the Medical Advisory Service is co-operating in his work. As the real price of liquor decreases *per capita* consumption rises and concern with the problems of alcohol dependence is now widespread.*

Occupational health surveys

The terms of reference published in 1949 of the Treasury Medical Service, which became the Civil Service Department Medical Advisory Service (MAS) in 1968, included occupational medical supervision of the entire civil service by (a) advising departments regarding the health of individual officers, (b) advising departments on environmental working conditions in relation to the health of staff and the efficiency of the service, and (c) providing emergency attention in cases of accident or sudden illness occurring on Government premises.

In its early days most time was devoted to the care of the health of civil servants working overseas and to their working environments, to advice on cases of prolonged sickness absence and to consideration of ill-health retirement. In the late 1950s epidemiological surveys into the causes of premature death and disability in the civil service were undertaken in addition to these activities, and all the time there was a steadily increasing stream of requests from departments for advice on occupational health topics. With the introduction of the Health and Safety at Work Act and legislation on safety committees the emphasis on occupational health increased. Though some areas of government property are not at present subject to the jurisdiction of the Health and Safety Inspectorate, management accepts that working practices should meet the terms of the new legislation. The bulk of the civil service population is occupied with clerical, administrative and managerial

* See note at the end of this paper.

tasks, and is a homogeneous group at low occupational risk. Its health problems are those of the establishment of a comfortable working environment compatible with optimum efficiency; attention has been focused on environmental and ergonomic factors such as heating, lighting and ventilation. Air-conditioning plants in large office blocks are often criticised; increasing noise levels from office machinery can cause problems and the introduction of visual display units has underlined the special needs of unit users. MAS surveys are looking at sickness absence rates in civil service buildings in London, some of which are air-conditioned and some of which are not, and at the effects of visual display unit usage. In another MAS study psychological and biochemical factors associated with menopausal symptoms in women are being assessed.

Other groups of civil servants include a mixed bag of specialists, each with specific occupational hazards not found in their more sedentary colleagues. They are often employed in an industrial or semi-industrial setting—the Stationery Office for example with printing and reprographic hazards. Other examples are the coastguards with the risks associated with cliff rescue, and forestry workers in whom chain saws can cause vibration damage and accidents. The MAS is involved in studies in these groups.

Lastly, there is a heterogeneous group of scientific and technological specialists in the scientific civil service. Their work extends from agriculture to zoology and their investigations from the atmosphere to the bottom of the ocean. No single industrial concern can match the breadth of expertise and technology nor the range of occupational health hazards within the scientific civil service. Some such as ionizing radiation are well recognised and catered for but in others the effects are still uncertain.*

The future of medical surveys in the civil service

The homogeneity of civil service grades, a stable population of co-operative and interested individuals and accurate data on morbidity mean that medical research organisations will continue to seek the help of civil servants in their search for the causes of disease and its prevention, to the benefit of the future health of the community at large as well as the civil service itself. The demand for the study of occupational health hazards by MAS is also increasing. As Dr Harrington, the Medical Adviser at the time, stated in a previous edition of *Management Services in Government* (May 1978), this will involve the MAS working ever more closely with Management and the Trade Union Side to help people in the service become healthier and more efficient.

* Lists of publications in medical journals on this research are available from CSDMAS, Tilbury House, Petty France, Westminster, London SW1H 9EU.

The Management Aim of a Government Department

S D WALKER, CBE, Civil Service Department

Until his retirement at the end of 1977, 'Johnny' Walker was Head of the then Management Services (Special Assignments) Division, CSD. He is currently engaged on a part-time basis in Management Development Division in funding experience gained on management reviews of government departments.—*Editor.*

It was common form when I took part in management reviews for the Department under review to stress that it was different from all other Departments. It was also common form for Departments to stress the difference between management of a Government Department and management of an industrial or commercial enterprise. The inference was clear. I and my colleagues should not make rash assumptions as to the relevance of experience gained in other Departments or of organisational and management theories based on industrial and commercial environments. Perhaps some of the former and just a little of the latter might have something to offer but the onus of proof was on those of us who wished to draw upon such external experience.

Differences as regards policy responsibilities

There is indeed considerable force in these contentions. Each Government Department is responsible for particular programmes or aspects of Government policies. It is true and probably inevitable that some overlaps of interest between Departments and some interaction between their objectives are to be found. For the most part, however, it is the intention that the responsibilities of Ministers and of the Departments which support them should be clearly delineated. In respect of the areas of policy which are laid to them, Departments are therefore different.

The significance for the organisation and management of Departments of these differences in their policy responsibilities may be enhanced by the arrangements for implementing the programmes and policies laid to them. In Departments like Customs and Excise and Inland Revenue, for example, and on the Social Security side of the Department of Health and Social Security (DHSS), the executive task of implementing policies falls wholly or mainly upon the staff of the Department. On the health side of DHSS however, this task lies mainly with the National Health Service and not with the Department itself. In other Departments implementation of policy is primarily in the hands of local authorities or other public sector bodies. There is in

fact a very considerable variety of arrangements for implementing Government policies and an equally varied range of relationships between Departments and those responsible for this task. Those relationships have to reflect the respective responsibilities, accountabilities and powers of the Minister concerned and of the external bodies on which he relies for implementation of his policies. The exact nature of each relationship is significant in considering a Department's internal arrangements for discharging its responsibilities.

Differences as regards management in the private sector

There is also force in the contention that management of a Government Department is different from management of a commercial or industrial enterprise. Of course, similar management functions are to be found in both environments. All activities have to be organised, planned, controlled, co-ordinated and staffed. But this superficial similarity should not be allowed to obscure the basic difference in the purposes for which public and private sector organisations exist. Government Departments do not exist to maximise profits in the long term nor (despite some apparent indications to the contrary!) to survive and grow. They exist to support Ministers in the formulation, administration and, in some cases, execution of government policies many of which are enshrined in legislation. This difference of purpose therefore inevitably raises questions about whether private sector experience can provide a suitable 'model' for the management of a government department.

Management of a Government Department

However, it would be unwise to assume that differences in terms of *purpose,* both in relation to policy and functions, necessarily imply differences in the *management task* which faces public and private sector organisations, including government departments. A building society may have some organisational similarities with a chain of retail shops but clearly there are differences between them and both are different from a manufacturing company. Despite this, experience suggests that all commercial and industrial enterprises have a management task which can be described broadly in similar terms and all of them have to undertake common management functions.

It has been suggested above that Government Departments share a common purpose in supporting Ministers. In pursuit of this purpose, Departments undertake a wide variety of activities and use financial and human resources. All of them have to organise their work and manage those activities and the resources used. It seems possible therefore that their overall management task—although different from that of an organisation in the private sector—is also capable of definition in common terms since it is performed in pursuit of a common purpose.

A definition of the management task of a Government Department has already been provided in this journal. An article by Richard Wilding* suggested a provisional definition for the study of management in Government and this effectively provides a definition of the common management task. It reads as follows:

'The study of management in Government is the study of the use of resources by Government Departments in playing their part in the formation and execution of Government policy. It covers the systems, methods, working relationships and organisational structures which the Department requires for this purpose, and the activities of planning, organising and controlling its work and of managing its staff.'

It will be seen that this definition covers both the formulation and, to the extent that it is a departmental responsibility, the execution of policy. It embraces therefore the analysis, costing and assessment of policy options as well as the administration and review of existing policies and all operational activities including specialist supporting services. It recognises that all departmental activities have to be organised, planned and controlled. The discussion of the definition in the article also makes it clear that it includes special aspects of the total management task such as personnel management and financial management. It confirms that all Departments have a common management task which, although it may differ considerably in detail, is essentially concerned with the management of resources used in the formation and execution of Government policy.

Performance indicators

Commercial and industrial experience is helpful in suggesting that it may be possible and desirable to formulate an aim or broad purpose in respect of the common management task. As already noted, it would be inappropriate to seek to undertake this management task 'profitably'. Nevertheless, Ministers, Parliament and the public are all presumably in favour of the proposition that government departments should be managed 'as well as possible'. What then is meant by the phrase 'as well as possible', and can we express it in an alternative form which is more amenable to measurement or assessment of performance? For this purpose, we have to identify some attributes or indicators which are relevant to the task of managing resources in the formation and execution of Government policies and then to consider to what extent performance in terms of those indicators can be measured or subjectively assessed.

Economy

In the Civil Service as elsewhere there are limitations on the resources available and the potential demand for resources always exceeds the

* 'Management in Government'. R W L Wilding, CB, *Management Services in Government*, Vol 30, No 2, May 1975.

supply. Consequently there has always been an emphasis upon economy—that is, frugality—in the use of resources. The Permanent Head of a Department has a special responsibility under his Minister for ensuring economy and, in his role as Accounting Officer, has to answer questions by the Public Accounts Committee of Parliament concerning the economic use of resources by his Department. Traditionally, his Principal Finance Officer and Principal Establishment Officer carry the main supporting responsibility for ensuring economy in the use of financial and human resources respectively. We can commence therefore with one yardstick which relates to the 'inputs' of resources used and which has long been seen by Parliament as one important indicator for judging performance. It is clearly possible to measure the resources used by a Department and it is possible—though it may sometimes be difficult and expensive to do so—to measure the resources used in respect of particular activities or particular organisational components of a Department and to compare the costs of those activities or units over time. In appropriate cases, it is also possible to compare the costs of similar activities or similar organisational units and to calculate 'unit costs'. One aspect of managing 'well' is therefore managing economically and input costs can certainly be measured, though there may be technical problems to solve in doing so at minimum cost.

If we examine the concept of economy in the use of resources a little more closely it soon becomes apparent that it can only provide part of the answer and that it cannot be used in isolation. A reduction in resources will usually have some impact upon one or both of two other important aspects of managing 'well'—efficiency and effectiveness. Thus, if a reduction in the resources used takes place without affecting the output, then both economy and efficiency are improved. In some cases however it may only be possible to increase efficiency by increasing the resources used. If economy is achieved without affecting efficiency, then it will lead to a reduction in the level of service being provided or in the level of control being exercised. Thus economies may be achieved by reducing the frequency of payment of subsidies or benefits or the frequency of visits to traders to inspect their books. In such cases it is the standard of effectiveness in implementing policy which is affected. We have therefore to consider efficiency and effectiveness as well as economy and also the interactions between these three indicators.

Efficiency

Efficiency is normally defined as the relationship between 'outputs' and the costs ('inputs') of achieving those outputs. When used in this sense, it is synonymous with productivity. The question which arises is whether Departments can measure efficiency. The answer to this question is largely dependent upon the meaning we attach to the term 'output'.

We can think of 'outputs' as referring to the visible results of the activities undertaken by Departments. For example, we might be thinking of the number of income tax assessments of a particular type completed and issued by an office of the Inland Revenue in a particular period of time; the number of payments of unemployment benefit made by an office of the Department of Employment or by a computer installation serving several offices; the number of forms or letters folded and enveloped by an individual or by a machine; the number of enquiries dealt with at an enquiry desk. The variety of outputs of this type across the civil service as a whole is immense. Provided we are thinking of this type of output, however—an 'intermediate output' as it is sometimes called—it is, by its very nature, countable and, with varying degrees of difficulty, the cost of achieving a given volume of each such output can usually be measured or assessed with adequate accuracy. We can therefore determine the efficiency with which intermediate outputs are achieved.

Some important qualifications are necessary as regards the measurement of efficiency. The work involved in making a payment or an assessment or in dealing with an enquiry may vary considerably as between one case and another. We must not treat significantly different outputs as though they are equal unless we are quite satisfied that it is safe to do so for certain purposes. We also need to know something about the quality or accuracy with which the work is performed before we come to any conclusions as to the significance of the data on efficiency. In some situations, the quality of the work may in fact be much more important than the efficiency as shown by the costs of intermediate outputs. Thus, while it is usually helpful to know the costs of a policy division, it is probably of little use to management to measure its efficiency in terms of the number of decisions taken, of draft submissions prepared or of policy options analysed. What is far more important in these situations is the quality of the contribution and its relevance to the Department's current priorities. Even where the efficiency with which activities are performed is clearly significant, it is still necessary to be satisified that those activities are contributing to the effective fulfilment of Government policies. In all situations we have therefore also to consider effectiveness.

Effectiveness

Effectiveness is a difficult concept. It has been defined as 'the extent to which the results achieved by an organisation in pursuit of its objectiveness meet its primary aims or purposes'. This definition is helpful because it stresses that effectiveness has to be related to 'primary aims or purposes'. Objectives however may relate to inputs, to outputs or to efficiency. That is to say, objectives may be agreed for attaining a reduction in costs, an increase in output, or a higher rate of productivity. The distinction between objectives and primary aims

may be of little importance in this context in commercial and industrial enterprises where both are ultimately judged against similar yardsticks. In Government Departments however, each Government policy requires a unique set of indicators for judging ultimate effectiveness and these indicators are different in form and character from the intermediate outputs used for measuring efficiency. For this reason, it may be less confusing if we use the word 'achievement' when we are referring to the extent to which any objective has been met and use the word 'effectiveness' only in relation to the attainment of primary aims or purposes.

In Government Departments therefore, the term 'effectiveness' can be used in relation to Government policies and to mean the extent to which those policies succeed in achieving their primary purposes. We refer, for example, to the effectiveness of the policies for health, social services and education in meeting the needs of society. When used in this sense, the ability to define and measure effectiveness is necessarily limited by the character of policy aims. These are often expressed in an 'open ended' and general form which does not lend itself readily to the specification of standards of effectiveness. However, all activities undertaken by Departments can be deemed to be undertaken in pursuit of Government policies. Despite the absence of objective criteria, Departments have therefore to consider the effectiveness of all their activities in relation to the fulfilment of policy. Thus, as noted above, the level of service provided determines the level of activity undertaken and is potentially related to effectiveness. Standards of effectiveness should be set to the maximum extent practicable even though decisions on such questions as the level of service may often have to be taken on the basis of subjective and political judgement.

The various aspects of effectiveness discussed briefly above are interrelated therefore. It is no use measuring achievement in reaching objectives—and may be positively harmful to do so—unless steps have been taken to ensure that those objectives are consistent with primary purposes. It is not very sensible to become more efficient in doing the wrong things! The complex and overriding problem which faces Departments is that of establishing suitable criteria by which to judge success in achieving policy aims. Only then is it possible for them to judge whether the activities and intermediate results which can conveniently be used for measuring economy and efficiency and for agreeing objectives of any kind are contributing to the effective achievement of the primary purposes for which Departments exist.

It is recognised that decisions on policy and policy priorities have to be based on political judgement. Provided it is also recognised that the judgement of effectiveness has usually to be subjective and political, we can use the three attributes of economy, efficiency and effectiveness in considering how well Departments are managed; but not in isolation from each other. It is the balancing of these often conflicting criteria which is the test by which to judge good management, and selection of

the best balance will always involve some considerable element of subjective judgement.

I have not referred directly to 'equity'. This is because I regard equity as an aspect of effectiveness. It is however an aspect of special significance and one to which Parliament attaches importance. I would not argue very strongly therefore if it were suggested that I should add equity to the list of attributes. The main point is that equity like effectiveness has to be balanced with economy. It is neither economic nor equitable to the public generally to pursue the payment of the last penny of the revenue due without regard to cost.

The common management aim

It is possible then to suggest a tentative definition of a primary management aim which is common to all Departments. It might take the following form:

'To achieve and maintain the best balance between economy, efficiency and effectiveness (including equity) in the use of resources in the formation and execution of Government policy.'

Of course, the expression and recognition of such an aim does not in itself do anything to solve the problems of measuring or judging success. Nor is it claimed that this tentative definition is not capable of improvement. It would however serve some purpose if it encouraged or provoked alternative definitions since time spent in considering the primary aims of an organisation is rarely if ever wasted. If agreement could be reached as to the existence and definition of a management aim it would provide a basis for the further development of performance indicators. It would still be necessary to consider the cost of developing particular performance indicators and their supporting information systems and to be satisfied that they will be used and that the benefits derived from them justify their cost. Recognition of a common management aim would also provide a common point of reference to which all members of a Department could relate their individual contributions and to which all managers could relate their particular objectives. That aim would also form the terms of reference for the management task falling on the Permanent Secretary and his senior colleagues in respect of the Department as a whole.

The Council of Civil Service Unions

P D JONES

The Council of Civil Service Unions came into being on 1st May 1980. It replaces the 60-year old National Staff Side as the confederating body for the nine trade unions representing non-industrial civil servants. In this article Peter Jones, the Secretary of the Council, explains why the Council was set up, its organisation and what it hopes to achieve.—*Editor.*

The need for change

The Civil Service is essentially a labour-intensive industry. It employs 560,000 non-industrial staff. The overwhelming major resource of the Service is the people employed in it. How these people relate to their jobs and employment conditions is, therefore, of prime importance to those who have to manage them. Individual attitudes in turn condition industrial relations, and the radical change that has occurred in Civil Service industrial relations in the past 10 years reflects the different attitude that the vast bulk of civil servants now have towards their employer. The change has, of course, impacted most noticeably on the way that civil servants have altered the trade unions that represent them. 'Staff associations' have been replaced by 'trade unions', each of which has readily embraced tougher methods of looking after what is perceived to be the interest of its members. Industrial action is now a feature of Civil Service industrial relations—an unthinkable development 10 years ago. All the Civil Service unions are now active members of the TUC. To use a current jargon phrase, the Civil Service unions have 'come out'. This, then, is the background to the change in the central negotiating and consultative body that represents the unions in dealing with the employer of civil servants: the Government of the day and its agent, the Civil Service Department. For the past few years the former central body, the National Staff Side (or, to give it its proper title, 'the Staff Side of the Civil Service National Whitley Council'), had struggled, with increasingly diminished success, to cope with the new attitudes and requirements of its constituent unions. It says a great deal for the durability and flexibility of the old National Staff Side that it lasted as long as it did. But change of a more profound nature was bound to come, hence the creation of the new Council.

The purpose of the change

The primary purpose behind the new body is to reflect the needs of the constituent unions in the current climate of Civil Service industrial relations during which the new Council will clearly be called upon to

present a firmer form of staff representation than has hitherto been normal under the Whitley system. Changing the organisation is, therefore, an integral part in improving Civil Service industrial relations. The aim of the Council will be to provide a more effective form of staff representation with a significantly greater degree of inter-union co-ordination and co-operation.

There is, however, another major intention behind the change. For some years now, the highly-centralised form of negotiation and consultation practised in the Civil Service has threatened to detach the negotiators from those whom they represent. By any standards, the Civil Service is a vast and diffused organisation in which communications are understandably a perennial problem. It is not surprising, therefore, that the 'grass-roots' membership of our trade unions has come to feel detached from the discussions that lead to the way in which their employment conditions are settled. The need for continuity of representation has led inevitably to a marked increase in the number of full-time union and Staff Side negotiators, and it was a sad reflection of this trend that very few actual, serving civil servants came anywhere near to participating in the negotiations determining their conditions. The very high degree of accountability practised by the unions—executive committees, annual conferences, journals and circulars, members' meetings and referenda—is still no real substitute for actual involvement in the crucial joint discussions that lead to the resolution of issues. The desire of lay members to be involved—'participation' is the current in-word—is, therefore, another of the main thrusts behind the creation of the Council.

The new organisation

In 1977 the former National Staff Side was registered as a trade union: the first federal body to be so registered. For the first time it became a legal entity and not simply an *ad hoc* body, the employee side of the joint labour relations council for non-industrial civil servants. The new Council is also registered as a trade union, and its creation completes the process begun in 1977 in establishing the central federal body representing the Civil Service unions as a separate entity. We shall still remain the employee side of the National Whitley Council, but are now known as the 'Trade Union Side'. That part of our function—providing the essential channel for negotiation and consultation with the Official Side—will still remain as a crucially-important day-to-day activity. In this area the Official Side will find no difference in the operational mode that was established during the 1939-45 war and which has endured since then. The Council secretariat will remain as the primary contact point for daily business. There will be some changes, however, in the manner of representation of the Union Side, and these are explained later in this article.

The governing body for all Council activities will be the periodic

meetings of the full Council, which is scheduled to meet at least quarterly. The membership of the Council is as follows:

Union	*Council seats*
Civil and Public Services Association	20
Society of Civil and Public Servants	11
Institution of Professional Civil Servants	11
Inland Revenue Staff Federation	8
Civil Service Union	6
Prison Officers' Association	3
Association of Government Supervisors and Radio Officers	2
First Division Association and Association of Inspectors of Taxes	2
	63

The Council will elect its chairman annually, and the aim is to facilitate the election of a serving civil servant as chairman. The Council will be the main forum for debating issues of prime importance, where there will be scope for wider cross-fertilisation of views between constituent unions. Most day-to-day issues will be dealt with by the Council's various committees, who will be appointed annually by the Council and who will be required to report all their activities to the full Council for endorsement. The committees are, however, empowered to initiate action between Council meetings provided there is either a consensus view on the committee about a proposed course of action or, if there is a majority in favour of a particular course, the minority does not object. If there is an objection by any minority, then the issue must be remitted to the full Council for decision. Voting will only normally take place on the full Council, where a two-thirds majority will be required on issues of major policy.

With one exception, the Council's working committees will be the same as those of the former National Staff Side: Personnel Management, General Conditions (formerly Committee B) Management Services, Computers, Training, Welfare and Accommodation, Superannuation and our own internal Finance Committee. As before, these committees will cover the area of work that their names indicate, and they will also be the Union Side of the Joint National Whitley Council committees that cover their area of responsibility.

The exception mentioned above is the creation of a Major Policy Committee, which will meet fortnightly and will comprise the principal negotiating officers of each union, plus one other representative if the union so desires. As its name implies, this committee will be responsible for major issues and it will clearly be the means through which most of the more important matters will be progressed between Council meetings. The Major Policy Committee will also have a Negotiations Sub-Committee comprising the principal negotiating

officers of CPSA, SCPS and IPCS together with the Secretary General of the Council and myself. The Sub-Committee has powers to include other union interests if appropriate, and all constituent unions have the right to be represented at formal meetings with ministers. Each Council Committee will have up to two representatives from each constituent union, this 'doubling-up' arrangement being intended to facilitate lay representation if the union concerned so desires.

The committees will be serviced, as with the National Staff Side, by a full-time secretariat. The Council's full-time officers are, initially, those of the former National Staff Side's secretariat: Bill Kendall as Secretary General, myself as Secretary and Brian Sutherland and Helen Hughes as Assistant Secretaries. It is intended to review, at an early date, the scope and effectiveness of the Council's office, which will remain at 19 Rochester Row, London SW1. The Council will also continue to publish *Whitley Bulletin,* but the intention is to change its name to *The Bulletin* in 1981.

As was the National Staff Side, the Council will be financed exclusively by the constituent unions, with each union paying a contribution based upon the number of Council seats it occupies.

Departmental Whitley arrangements

Departmental Whitley Councils are autonomous and it will therefore be for each to consider what consequences the changes at National level will bring for them. We have suggested that it would be both sensible and consistent for Departmental Staff Sides to become 'Departmental Union Sides' and our constituent unions will be taking action to progress this change in each department where they are represented. It seems reasonable also to expect that the attitudinal change that lies behind the reconstruction of the National union confederation will be reflected in the majority of Departmental Staff Sides, particularly the larger ones where parallel developments have occurred. The vast bulk of Civil Service industrial relations contacts takes place in departments and their outstations, so the firmer form of representation at National level will, in filtering down to departmental, local and line management, provide a more accurate reflection of the current attitude of civil servants to employment issues. Recent procedural agreements on staff inspections, the Rayner scrutinies and on the use of management and computer consultants—and the expected agreement on new technology—will also provide a strengthened basis for local joint consultation. Both Sides of the National Whitley Council have undertaken to conduct a joint review of departmental and local Whitley arrangements, together with other aspects of industrial relations in the Civil Service. This review should supplement the developments outlined above and should both raise the standing of industrial relations management in the Civil Service and provide a better framework for carrying it out. My expectation is that managers, particularly those in line management, will need to work

much harder at their industrial relations—but that they will then find a much better climate of staff relations emerging as a result.

Aims and aspirations

What does the Council hope to achieve? The short answer is, of course, that it will seek to fulfil the aims that lie behind its creation: to provide a more effective form of representation in line with the current requirements of Civil Service unions, and to encourage a closer relationship with those whose interests the Council represents. This is the basis on which all the constituent unions agreed that the new body should be brought into being. Like all new bodies, however, it will develop its own methods of operation and the style in which they are carried out.

My own expectation is that the Council will quickly adopt all the strengths of the organisation which it has replaced, and will then move on to provide the firmer kind of representation that civil servants and their unions require. The management of industrial relations in the Civil Service is not going to be easy during the 1980s, and will pose a considerable challenge to both management and unions alike. Just as unions often fail to understand management problems, so does management often underestimate union difficulties—and these difficulties can multiply when a multi-union organisation covering a wide spectrum of interests (from cleaners to Permanent Secretaries) is involved. We believe that in creating the new Council and in ensuring that it works in the manner intended at its creation, the Civil Service unions have provided an improved framework for inter-union action. This should, in turn, make a significant contribution to the overall development of our industrial relations in the hard days ahead.

Introducing Change in the Unemployment Benefit Service 1973-80

LEIGH LEWIS, Department of Employment

Leigh Lewis is a Principal in the Department of Employment who has recently been involved in an examination of various aspects of the Unemployment Benefit Service as part of Sir Derek Rayner's exercise to increase the efficiency of central government administration. In this article he describes two major changes introduced in recent years.—*Editor.*

The Department of Employment's Unemployment Benefit Service is large by any standards. At the beginning of 1980 it employed some 15,700 staff in over 1,000 offices dealing with around 1·4 million unemployed people. In the financial year 1978/79 over 4 million claims to benefit were made and the total paid out by the Benefit Service in unemployment and supplementary benefits was £1,300 million. This sum is not of course 'turnover' in the commercial sense but the fact that only about 25 of the 1,000 largest UK industrial companies had a turnover in 1978 in excess of the figure puts the financial scale of the operation into perspective.

The difficulties of introducing change

Introducing major change into organisations of this size—be they private or public sector—is never easy. As has often been apparent over recent years both managers and employees are apt to regard major upheavals to long-established practices and procedures with suspicion, particularly where these arise from the introduction of new technology. Making changes is more difficult still where the organisation concerned is part of a Government Department responsible to Parliament for paying out large sums of public money to large numbers of beneficiaries, each of whom has the right to expect 100 per cent accuracy and promptness in fulfilling his or her entitlement. In such a situation change, if it is to be successful, must be introduced without any reduction in standards, even during the changeover period. Moreover, because Departments are accountable to Parliament, the public are far more likely to concern themselves with the changes proposed than with similar changes in the private sector.

It is therefore perhaps the more noteworthy that over the last five years the Unemployment Benefit Service has seen the virtual completion—with major benefits in terms of increased efficiency and

service to the public—of two large-scale and fundamental changes to its entire way of working.

The background to computerisation

The first of these changes began in 1969. In July of that year, coincidentally almost 21 years to the day since the National Insurance scheme began, the Ministry of Labour's Reading Employment Exchange was experimentally linked to a Department of Health and Social Security computer in Reading which thereupon took over much of the work previously done manually at the Exchange in calculating and paying unemployment benefit.[1]

Before 1969 all unemployment benefit work was done manually. When a person claimed unemployment benefit at a local office details of his claim were taken by a clerk and an enquiry was prepared and sent to the DHSS Records Branch in Newcastle, requesting details of the claimant's national insurance contributions for the relevant period. Once a reply was received a clerk had to work out the unemployment benefit payable having regard to the numerous different circumstances which could affect entitlement to benefit or the rate of payment. Increases for dependants had also to be calculated and added to the basic rate. Once the correct payment had been calculated, the claimant would be informed and thereafter paid in cash at the local office each Thursday or Friday.[2] Until 1966 the claimant had also had to attend two days earlier in the week to declare that he remained unemployed (known more commonly as 'signing on'). However, from 1966 onwards, because of rising unemployment, claimants both signed and were paid on the same day.

During the early 1960s consideration was given by both the DHSS and the DE to the possibility of computerising some of this manual work, and in 1964 they jointly agreed to try out a pilot scheme in London covering unemployment, sickness and some other short-term benefits. National Insurance Offices and the larger Employment Exchanges in London were to be linked to a computer at Reading, using land lines over which claims data would be fed from computer terminals in each office directly into the central system. Information on both past and present claimants would be gradually taken on by the computer centre, until details on around 2 million claimants were held, of whom about 270,000 were likely to be claiming benefit at any one time. For unemployment benefit the intention was that the

1. In 1968 the Ministry of Social Security had been amalgamated with the Ministry of Health to become the Department of Health and Social Security (DHSS). The Ministry of Labour had become the Department of Employment and Productivity in 1968 and became the Department of Employment (DE) in 1970. Henceforth in this article the present-day titles of both Departments are used.
2. From 1965 onwards an experimental system of payment by girocheque posted direct to the claimant's home rather than cash was being tried out in about 5 per cent of offices.

computer should take over most aspects of 'rating' (i.e. calculating the rate of entitlement to benefits), 'computation' (i.e. calculating the amount of each payment) and indeed payment itself—the latter by computer produced girocheques posted direct to the claimant's home.

Developing the computer system

In terms of the technology available in 1964, even this pilot project was ambitious both in size and concept. Technology was still evolving and the ICL 1906 computer ordered for the pilot system was one of the largest then available. Design and programming work was carried out almost exclusively by Civil Service specialists drawn from DHSS and DE, with ICL providing only normal company support.

Systems development work built up during 1965/66 and during 1967/68 more than a quarter of a million program instructions had to be written. Systems trials began in January 1969 and in July of that year the Reading Employment Exchange was experimentally linked to the computer. The experiment was an immediate success. The staff at Reading settled down remarkably quickly to the radically new procedures and the reaction from claimants was favourable. As a result, during 1969 and the early 1970s an increasing number of Employment Exchanges in London were linked to the system. By the end of 1970 there were four, by the end of 1971, when it was decided to extend computerisation nationally for unemployment benefit, 20, and by the end of 1972, 32. In October 1972 the project was extended to South Wales. However the trial introduction of computer procedures into DHSS local offices threw up a number of difficulties and it was decided in 1971 to confine the project to the Unemployment Benefit Service.

National extension

Over the last five years computerisation has gradually been extended nationally. By the end of 1973 55 local offices (know now as Unemployment Benefit Offices) were linked to the computer. By the end of 1975 the figure was up to 129, by the end of 1977 it was 270 and by the end of 1979, 476. In addition a further 352 small satellite offices, mostly part-time, are now linked in via the computer terminal at their parent office. Thus 828 offices out of something over 1,000 are now operating computerised procedures. The take-on of offices was speeded from January 1977 onwards with the opening of a second computer centre at Livingston in Scotland to which offices in Scotland and Northern England began to be linked. The percentage of all claims to unemployment benefit dealt with by computer increased from an average of 12 per cent during 1973/74 to 22 per cent during 1975/76; reached nearly 50 per cent during 1977/78; and rose to an average of 80 per cent during 1979/80. It is now over 85 per cent.

It is particularly significant that these increases should have taken place against a background over the 1970s of sharply rising unem-

ployment. The original system was designed to handle a maximum of around 600,000 live claims to benefit—at a time when there were around 450,000 claimants. In fact the system is now handling approaching 1·1 million live claims and could cope with many more. Inevitably the rise in unemployment has meant the introduction of more equipment than was originally planned and there are now three ICL 1900 series computers at both Reading and Livingston. It is greatly to the credit of those who now operate it that, despite the rise in unemployment to twice the system's original design capacity, there have only been two days—outside periods of industrial action—when the computer has failed to print and despatch to claimants every girocheque due out on that day's main run. And even then very few of the day's load had to wait until the following morning.

Benefits of computerisation

The advantages which the computer system has brought with it are substantial. It has saved large sums of public money. It has substantially improved the service to claimants. And it has given the Benefit Service considerably more flexibility in responding to the ever-changing demands placed on it.

Money

To take public expenditure first. Computerisation has led to staff savings in local benefit offices—all achieved through natural wastage—of something over 15 per cent. The impact of this reduction can be seen most readily in figures for the ratio of claimants to local office staff over recent years. In 1973/74 this ratio stood at 55:1. In 1979/80 it is expected to be 70:1. The savings arising from the reduced numbers of staff in local offices have of course to be offset against the capital, staff and running costs of the computer system. However, when all these factors are included a substantial net saving to public funds remains—estimated by DHSS to be around £3 million in 1978/79.

Better service

In looking at the effect on claimants, the introduction of computerised procedures into offices has to be linked with the switch from payment of unemployment benefit in cash to payment by girocheque. As noted, this had been happening in a few experimental offices since 1965. However, the fact that payment by girocheque direct from the computer centre was an integral and essential part of the system design for computerisation added very substantially to the argument for making payment by girocheque direct to claimants' home addresses universal, as the then Government eventually decided to do in 1971.

For the claimant that decision brought substantial benefits. It meant that payment came direct to his or her home. And it enabled signing

on to be spread right through the week and hence did a good deal to remove the dole queue image of the old Labour Exchanges.

Greater flexibility

The third advantage—flexibility—was from the start a design requirement of the system. The best evidence of this is that the system has coped with unemployment at far higher levels than were ever expected. In July 1969, for example, when the first local office was linked to the computer system, the seasonally adjusted unemployment figures for Great Britain stood at just over 400,000. In January 1980, the figure was approaching 1·3 million. Indeed if computerisation had not been introduced and extended during this period, the Benefit Service would have had the greatest difficulty in coping with such a major increase in unemployment.

Built-in flexibility is also evident in other ways. 'Uprating'—i.e. changing each individual payment following an increase in the rate of unemployment benefit—took hundreds of staff weeks to complete under manual procedures. With the computer the work is done in about 20 minutes by one programmer. The taxation of unemployment benefit—which the Government is now considering—would be a much more complex and difficult operation to contemplate if unemployment benefit was still dealt with clerically. Statistics on unemployment benefit can be collected more easily and more precisely under the computerised system than under its manual equivalent. In short the computerised system has given management in the Unemployment Benefit Service the capacity to handle most major contingencies much more easily than in the past.

Computerisation then has been a radical break with the past—perhaps the largest single administrative change the Benefit Service has ever undergone. The second of the major changes introduced over the last five years—fortnightly attendance and payment—was less fundamental. Nevertheless it too has played a major part in changing the face of the Unemployment Benefit Service.

The move to fortnightly attendance and payment

The proposal to introduce fortnightly attendance and payment (FAP) dates back to 1976 when the then Government called upon all Departments throughout the Civil Service to make reductions in their forecasts of administrative expenditure in 1978/9 and directed that this should be achieved mainly by cutting inessential policies and practices. To achieve the required savings in DE, a number of options were considered including provision for fortnightly instead of weekly attendance at Unemployment Benefit Offices, accompanied by fortnightly payment—thus breaking a tradition of a least once a week attendance which stretched back some 60 years.

The trial scheme

From the outset it was accepted that so radical a change in procedures would have to be tested on a trial basis in a number of offices before it could be implemented nationally. In order to monitor these trials a Joint Working party of management and trade union representatives was set up. A total of 36 offices and associated sub-offices was selected to take part in a three-month trial commencing in September 1977, during which benefit would be paid a week in arrear and a week in advance of claims—covering two weeks in all. Temporary regulations, under the Social Security Act 1975, were brought in to allow fortnightly attendance and payment to be introduced at the pilot offices.

At the end of the trial period the Joint Working Party reported to the Secretary of State on the experiment. The conclusions of the majority of the Working Party were that staff and management in the pilot offices were generally in favour of the scheme; that the majority of claimants preferred the new arrangements; that although the new procedures were rather more vulnerable to overpayment than the weekly system because of the advance payment of benefit, the estimated savings on staff and Post Office charges considerably outweighed the maximum possible losses; and finally that the pilot scheme had shown that fortnightly attendance and payment was a practicable and worthwhile improvement in the service which the Department offered to claimants. A dissenting set of conclusions from the largest of the four Trade Unions on the Working Party, the Civil and Public Services Association, noted that, whilst fortnightly attendance and payment had advantages, there was a need to consider seriously whether the proposals should be implemented nationally in view of the possibility of increased overpayments and of hardship to some claimants.

The Government's response to the report was given to Parliament in May 1978. MPs were told that the Government favoured the fortnightly system but had decided that the pilot procedures needed some refinement, particularly to minimise overpayments, and that the timing of extension to the whole of Great Britain would be decided later. Temporary regulations were made to allow the pilot offices to continue operating fortnightly procedures so that the necessary refinements to the system could be made. Following these further changes the Government was able to announce in December 1978 that national extension of fortnightly attendance and payment would take place as from September 1979, and this duly occurred.

Obstacles overcome

The preceding paragraphs, which highlight only the bare bones of the story, perhaps give the impression that the move to fortnightly attendance and pay was a simple change accomplished without much difficulty. The reality was greatly different. Management had to

overcome numerous major difficulties over a three-year period to push the change through. First, and most important, they had to devise procedures for fortnightly attendance and payment which would cover the many contingencies that can arise while an individual is claiming benefits. These had to range from procedures for recovering money from the claimant who found work for a period for which he had already received an advance payment of benefit to dealing with the claimant who, usually because of difficulties over budgeting, wanted still to be paid weekly. Secondly, management had to convince staff, against a background of sustained opposition and selective industrial action from the biggest trade union concerned, that what was being proposed was right in itself, necessary to meet the Government's requirements for economics, and carefully and sensibly worked out. Thirdly, they had to convince those outside interests and organisations most concerned that the proposals would benefit both claimants and taxpayers and would lead neither to reckless distribution of public money nor hardship for claimants. Against this background it is to the credit of management that when the scheme was extended nationally in September 1979, its introduction went remarkably smoothly and its subsequent operation has shown most of the fears expressed about its effect on staff and claimants to be without substance.

Advantages of the fortnightly system

What have been its advantages? After allowing for resources to offset the higher risk of overpayments and the increased work associated with more complicated signing and payment arrangements, it has achieved an estimated 5 per cent saving in the staff cost of administering unemployment benefit. This means a reduction in staff numbers of about 800 at present levels of unemployment which is being achieved, as with computerisation, through natural wastage. Staff numbers required in UBOs are assessed by a formula which reflects the time needed for particular tasks—not all of which are affected by the change to FAP. The times taken for the tasks which are affected by FAP have been adjusted on a temporary basis but need to be validated by a further work survey. To the staff savings must be added savings in reduced postal and stationery charges worth around £4/5 million a year. The fortnightly system has also improved the service given to claimants. Most now attend only once a fortnight and many of them will save on fares as a result. When they do attend the office they find that queues are shorter and staff are under less pressure with more time to deal with problems or enquiries. But there is no compulsion to accept the fortnightly system. If a claimant finds it hard to budget over a fortnightly period he can opt to remain paid weekly. At present about 8 per cent of claimants are paid weekly. Lastly, fortnightly payment has improved the working conditions of many staff. The pilot experiment showed that most staff felt that they had more time to deal

with claimants and more control over the flow of work under the fortnightly system.

Conclusions which emerge

What conclusions, then, can be drawn from the introduction of computerisation and fortnightly attendance and payment into the Benefit Service? First, that despite the special pressures placed on Government Departments by their accountability to public and Parliament, major changes can be successfully introduced. Secondly, that it is altogether too easy to assume, as do so many commentators, that Government administration is of its very nature inefficient and unchanging. With the advent of fortnightly attendance and payment the ratio of claimants to staff in local benefit offices will probably be around 80:1 in 1981/82 compared with 55:1 in 1973/74—an increase in labour productivity of approaching 6 per cent over eight years, compared with an increase in the economy as a whole of around 1 per cent annually over broadly the same period. And thirdly, that the recent experience of the Benefit Service supports the view that significant economies in Government administration can be made by changes in administrative practices which need not affect, and indeed can improve, the services being delivered.

Analysing Personal Names

JAMES TRAVERS, General Register Office, Scotland

Mr Travers is a statistician. His article may be of interest to users of manual as well as of computer systems—*Editor.*

Introduction

Civil registration of births, deaths and marriages began in Scotland in 1855 though there had been a parish registration system as far back as 1553. From 1855 a series of annual alphabetical indices has been prepared, for each event, listing the sexes separately. These indices provide rapid reference to particular births, deaths or marriages. Multiple entries in the indices accommodate hyphenated names, maiden and married names, etc.

From time to time surveys have been carried out in these indices on the frequency of occurrence of surnames and Christian, and other, forenames. The most recent survey analysed the birth, death and marriage alphabetical indices for 1976 surnames, and the birth indices only by forenames. Further analysis of the 1977 indices provided information on name size. The computerisation of the indices made complex analyses possible.

Some results of these surveys are being published in the Annual Report of the Registrar General for 1978. This article consists of extracts from the report with some additional comment but much more detailed information is available at the General Registrar Office, Scotland (GRO(S)) for reference and researchers.

Surnames

The table below lists the 10 most common surnames in 1976, and in 1858, 1935 and 1958 when the three previous surveys were carried out.

	1858	1935	1958	1976
1	Smith	Smith	Smith	Smith
2	MacDonald	MacDonald	Brown	MacDonald
3	Brown	Brown	MacDonald	Brown
4	Robertson	Wilson	Thomson	Wilson
5	Thomson	Thomson	Wilson	Campbell
6	Stewart	Robertson	Stewart	Thomson
7	Campbell	Campbell	Campbell	Robertson
8	Wilson	Stewart	Robertson	Stewart
9	Anderson	Anderson	Anderson	Anderson
10	MacKay	Johnston	Johnston	Scott

For the purpose of this table the Macs and the Mcs have been counted together, although the 1976 survey counts them separately. Smith, MacDonald and Brown are still first, second and third with 2,726, 1,982 and 1,967 occurrences, but MacDonald was a poor second to Smith.

Over the 120 years Robertson, Stewart and MacKay have become less frequent whilst Wilson, Campbell and Scott have occurred more often.

Complete listings of all surnames by event (birth, death or marriage), by sex, are available for reference in GRO(S).

Information is also available on surnames by regions. Smith leads in six of the regions whilst MacDonald comes first in the Highlands, Sinclair in Orkney, MacLeod in the Western Isles, Scott in the Borders, Brown in the Central Region and Wilson in Dumfries and Galloway.

Table A appended provides a distribution of surnames by initial letter. Those beginning with Mac and Mc are shown separately from the rest of those beginning with the letter M. The distribution provides a useful guide to those preparing or planning an indexing system for Scottish surnames.

Forenames

The following table lists the ten most popular Christian names, for

	1858	1935	1958	1976
1	John	John	John	David
2	James	James	James	John
3	William	William	William	Paul
4	Alexander	Robert	David	James
5	Robert	Alexander	Robert	Andrew
6	George	George	Thomas	Steven
7	David	Thomas	Alexander	Scott
8	Thomas	David	Ian	Mark
9	Andrew	Andrew	Brian	Robert
10	Charles	Ian	George	Stephen
1	Margaret	Margaret	Margaret	Nicola
2	Mary	Mary	Elizabeth	Karen
3	Elizabeth	Elizabeth	Mary	Claire
4	Annie	Catherine	Linda	Angela
5	Jane	Annie	Anne	Fiona
6	Janet	Isabella	Catherine	Susan
7	Isabella	Agnes	Susan	Jennifer
8	Agnes	Jean	Helen	Julie
9	Catherine	Helen	Ann	Gillian
10	Helen	Janet	Fiona	Michelle

boys and girls, recorded in the birth indices in each of the four study periods.

David now leads the boys whilst the favourites for a hundred years, John, James and William, have slipped somewhat. Between the first three studies, there was little movement into, or out of, the first ten but in 1976 five of the first ten were new entrants.

Girls, except for the top three—Margaret, Elizabeth and Mary—had always shown more change but in 1976 there was a real upheaval. Eight of the first ten are new entries. Even the two remaining, Fiona and Susan, appeared as recently as 1958. Nicola leads the field as a girl's name.

The use of the computer system provided a further opportunity to provide interesting and useful information on the multiplicity of forenames in the birth indices for 1976. The following table shows for each sex the number of forenames given to children born in that year.

Number of forenames	Number of events	
	Males	Females
1	9,363	11,181
2	21,694	18,488
3	2,333	1,623
4	94	85
5	14	16
6	2	—
7	1	—
8	—	—
9	—	1
10 or more	—	—
Total	33,501	31,394

There is a tendency to give more forenames or Christian names to boys than to girls. The largest number (9 forenames) was, however, given to a girl.

The advent of computer processing with its need for information on field lengths, the requirements of form design and other processing, have prompted a further tabulation set. The numbers of characters in the surnames and forenames included in the indices for births, marriages and deaths for 1977 were examined. In the case of surnames, the total length in the surname field was calculated even if it included a space or a hyphen. In the case of forenames, the first three only were examined and treated as individual forenames.

Table B appended provides distributions of surnames and forenames by character length, the total for each size group, their percentage of the total together with a tabulation of accumulated totals

and percentages. Almost 99 per cent of all surnames can be covered by only 10 characters. A disproportionately larger number of characters is required for any better coverage. In the case of forenames, slightly more than 99 per cent can be covered by 10 characters and better coverage is more easily obtained.

Table A Distribution of Surnames by Initial Letter, Scotland, 1976

Initial Letter	Number of Entries	Percentage Distribution
A	6,420	3.13
B	16,691	8.13
C	17,232	8.40
D	10,870	5.30
E	2,113	1.03
F	7,765	3.78
G	10,638	5.18
H	12,229	5.96
I	1,321	0.64
J	3,545	1.73
K	5,560	2.71
L	7,683	3.74
Mac	6,593	3.21
Mc	19,943	9.72
M	15,980	7.79
N	2,894	1.41
O	2,207	1.08
P	6,421	3.13
Q	476	0.23
R	10,621	5.18
S	17,643	8.60
T	6,771	3.30
U	282	0.14
V	538	0.26
W	11,511	5.61
X	1	0.00
Y	1,195	0.58
Z	85	0.04
	Total 205,228	100.00

Table B Frequency of Surnames and Forenames by Size, Scotland, 1977

Total Characters	Surnames		Forenames		Total Characters	Surnames		Forenames	
	Names Examined	% of Names Examined	Names Examined	% of Names Examined		Accum Total	Accum % of names examined	Accum Total	Accum % of names examined
1-3	2,879	1.43	13,063	3.41	1-3	2,879	1.43	13,063	3.41
4	19,580	9.77	63,449	16.55	1-4	22,459	11.21	76,512	19.96
5	34,702	17.32	85,755	22.37	1-5	57,161	28.54	182,267	47.55
6	48,766	24.34	88,983	23.21	1-6	105,927	52.88	251,250	65.54
7	36,726	18.33	56,550	14.75	1-7	142,653	71.21	307,800	80.30
8	31,574	15.76	37,975	9.91	1-8	174,227	86.98	345,775	90.20
9	17,488	8.73	31,418	8.20	1-9	191,715	95.71	377,193	98.40
10	6,360	3.17	4,009	1.05	1-10	198,075	98.88	381,202	99.45
11	1,494	0.75	1,915	0.50	1-11	199,569	99.63	383,117	99.95
12	458	0.23	153	0.04	1-12	200,027	99.86	383,270	99.99
13	117	0.06	31	0.01	1-13	200,144	99.91	383,301	99.99
14	71	0.04	14	0.00	1-14	200,215	99.95	383,315	100.00
15	57	0.03	5	0.00	1-15	200,272	99.98	383,320	100.00
16-25	44	0.02	6	0.00	1-25	200,316	100.00	383,326	100.00
TOTAL	200,316	100.00	383,326	100.00	TOTAL	200,316	100.00	383,326	100.00

Conclusion

The survey was conducted mainly on 1976 records but a sample survey on the 1979 birth indices indicates that there has been no recent significant change in the popularity of Christian names.

Whilst there is no doubt that statistics on names, especially forenames, appeal to those who are interested in popularity of names, interesting and unusual names and names common to boys and girls, the statistics themselves serve a utilitarian purpose in providing information to those who are setting up filing and data processing systems, population registers and so on.

Complete listings of the data are available at GRO(S) to researchers and enquirers. The separate indices for deaths, marriages and births by region would, for example, provide a fruitful field for research into population shift in geographical area by origin.

The Management of ADP Standards

This is an extract from the Central Computer and Telecommunications Agency's Central Government Code of Practice No 13, entitled *Management of ADP Standards.* — *Editor.*

Introduction

This extract provides an introduction to standards management and lays down general guidelines for use in all government departments. Its purpose is to define for management those steps which need to be taken to introduce, maintain and control formal standards in computer installations.

The information is relevant to all levels of management and supervision as well as to those staff concerned directly with the implementation and maintenance of standards. Whilst the details will be of particular relevance to those projects and/or installations where standards arrangements have yet to be formalised, it is expected to be helpful generally in keeping established arrangements under review. It is recognised that individual features of this guidance will not necessarily be applicable in all situations.

Standards should be objective and define specific practice to be followed without unauthorised exception. Where exceptions to the standards can be justified then they should be within clearly-defined limits. For the purposes of this extract the term 'standards' is used collectively to include the following less definitive categories of practice:

> codes of practice, which describe preferred procedures, techniques, etc., and which may be interpreted to meet specific requirements;
> conventions, which determine for a particular project and/or installation which of a number of generally appropriate practices should prevail.

Benefits of standards

During the past few years there has been an increasing awareness of the need for, and the benefits arising from, comprehensive ADP standards. As data processing expands and systems become more complex, the need to specify and use effective standards becomes apparent. This extract is aimed at encouraging management to make proper use of standards in order to realise some of these benefits which include:

better utilisation of staff and equipment including better arrangements for transfer
quicker training and assimilation of new staff
reduction in duplication of effort
improved communications both within projects and also outside
easier maintenance
easier portability of software.

Commitment and involvement

Senior management commitment to standards is crucial and needs to be made prior to any development work. Management should be fully aware of the need for standards and of the resources likely to be required. Involvement of staff at all levels is also necessary both in the initial discussions about standards and in the later stages of the standard project.

Development and control

The task of drafting, implementing and maintaining installation standards (referred to here as 'standards development') is analogous to the introduction of a data processing project in that similar stages of development have to be undertaken in a planned fashion. As in any data processing project, management control of the standards development task is essential. When the development phase is complete and the standards are in use, the next problem to be faced concerns the control of the standards in practice. Naturally enough, the first line of control is with line management but, particularly in medium and large installations, the diversity of background and opinion amongst line managers can bring a similarly varied approach to the implemented standards. It is therefore the recommendation of Code of Practice No 13 that, where it is possible, a separate Standards Section should exist, preferably away from the main programming and systems areas. However, it is recognised that this sort of organisation is not always practical and there will be cases where the overhead of a central section could not be justified. Even in these circumstances there will presumably be one member of staff nominated as the Standards Liaison Officer and this person, although having other duties, should be responsible for the installation documentation as well as representation on standards matters up to the senior levels.

Scope

A standards system should be planned to cover all aspects of computing, and development of standards in particular categories (e.g., documentation, operations, programming techniques, etc.) should not be undertaken in isolation but as part of a total integrated plan. In practical terms implementation would be likely to take several years to

achieve with phased development and introduction depending upon resources and other commitments. The standards which are adopted should be applicable as far as possible both to all existing projects and also to those planned for the future. A standard may occasionally be specially developed for the particular installation concerned, but in most cases it will be a locally adapted version of a more widely applicable standard (e.g. departmental, government, national, etc.).

Plan for developing standards

The following stages will be undertaken in a standards development project but are not necessarily consecutive. Later paragraphs examine each stage in more detail:

management commitment
management control
staff involvement
development (review and drafting)
discussion and revision
approval
publication
training
implementation
timetable.

Management commitment

The fundamental importance of management commitment at all stages of the project cannot be over-emphasised. Staff, at all levels, should be made aware of that commitment. It is not sufficient merely to subscribe to the principle of standards—resources will be required:

to develop and agree the standards
to train staff
to monitor for adherence to standards
to review and amend the standards according to changing installation requirements.

Management control

In order to fulfil this commitment it is necessary to establish formal consultative/decision-making machinery for overseeing the development, implementation and observance of standards. The machinery set up here will depend both on the size of the installation and on departmental procedures already established. For example, in a very small installation consultation may be on an informal day-to-day basis, whereas a larger department with possibly more than one installation will require more formal procedures. In very large departments with centralised management services organisations, standards may have to be endorsed and reviewed by a central management body to ensure, where practicable, uniformity

throughout the department. In all cases, however, the procedures to be followed should be clearly defined.

Staff involvement

However carefully the standards development task has been undertaken, success will not be achieved unless installation staff are convinced of the need for the particular standards. If staff are involved closely in the standards development task from the outset, the chances of achieving acceptance will be much greater. The experience of the person doing the job must not be overlooked but, because every individual has his own ideas of the standards required, certain constraints must be imposed in the interests of uniformity and objectivity.

Development

This stage plus the successive stages up to the implementation date, should be carefully planned to a timetable which should be reviewed and amended as necessary throughout the course of the project.

The development task falls into two parts—the review of existing standards and the drafting of new standards and amendments to existing ones. In the case of the former, existing standards which reflect current practice adequately should not be changed without good reason. However, with the benefit of practical experience amendments may be found to be necessary. In most cases the drafting is related to the amendments or adaptation of standards which already exist in some form, thus giving the advantage of using proven standards. Drafting a complete standards manual from scratch is not recommended except in areas of new technology.

Discussion and review

The Standards Committee should consider the draft standards before they are circulated by the chairman for discussion and comment. The chairman should allocate a set period of time for comment (usually about one month). Channels of communication should be organised whereby comments may be sought from all concerned and filtered through co-ordinating points to the sub-group responsible for drafting. Discussion should be held and comment sought from the user in respect of standards having an effect outside the installation. Comments which are accepted will be incorporated in the final draft which will be presented to the committee for approval. All comments should be acknowledged.

Approval

The Standards Committee will decide upon matters of controversy and, depending upon the committee's terms of reference, will give authority or make recommendations for the final version of the standards before publication. In some instances the committee may

approve the introduction of a particular standard on a probationary basis in order to test its effectiveness.

Publication

Standards should be published under cover of a promulgatory notice signed by the head of the installation or of the relevant central management committee. Proposals for training, implementation, control and the arrangements for submission of amendments should be made clear to all concerned. Care should be taken to ensure that all those involved in the use of the standards have easy access to the appropriate manuals. Staff should also be informed of any other related standards development tasks envisaged or of progress on those still outstanding.

Training

Experience has shown that staff who are trained in the use of their installation standards accept them more readily and become efficient in their use more quickly. Training will be required for existing staff who are to use the new standards. A number of methods exist, for example:

courses mounted by departmental or installation training staff;
in-house courses by consultants;
external courses in the case of a general standard—not locally developed.

Implementation

A provisional implementation plan should be drawn up at the start of the project and revised as necessary throughout the development stages. The introduction of most new standards should not create problems in the running of an installation. Indeed, in many instances introduction is required as soon as possible in order to reduce problems. The best time to introduce new standards is immediately prior to the development of new or revised systems, possibly at the time when plans are being made for a new configuration. However, in many cases, new standards are adopted in existing installations concerned with on-going work. There are three main possibilities:

Implementation for all new systems from a defined date.

Implementation for all new systems and significant amendments to existing systems. (It is essential to define 'significant amendments' precisely within the installation to avoid misunderstanding.) In this way phased implementation as far as existing systems are concerned is achieved by gradual replacement with the new documentation and procedures.

Implementation across the board including re-documentation of existing systems and programs.

Experience to date has shown that installations prefer to adopt the first method.

Timetable

It is important in any event for the project and standards control staff to agree upon a realistic timetable for the introduction of standards. Such a timetable may stretch over a number of years but, whatever the timescale, a controlled approach must be adopted. Training and implementation plans will need to be closely related. Usually, once staff have been trained in new standards, they are anxious to put them into effect. The keynote must be one of flexibility with standards control staff and project team co-operating to ensure that the standards are introduced at a mutually convenient time.

Control and maintenance

The continued importance of management commitment and staff involvement needs to be re-emphasized here. When formal standards have been introduced for the first time, it is particularly important that management and staff at all levels keep a close check both on the use and observance of standards and also take steps to keep them up to date. In due course the use of standards which are properly introduced will become an integrated and fully accepted part of day-to-day procedure.

Summary

The main features of the management of standards are summarized below. If standards are to be successfully adopted:

- senior management in the installation needs to maintain a commitment to their development and use;
- adequate resources need to be allocated;
- development, implementation and maintenance needs to be carefully planned and controlled;
- all aspects of standards should be the subject of regular review to ensure that they continue to reflect current practice and needs within an installation.

Note

Copies of the full version of this publication are available, price £1, cash with order, from the Central Management Library, Civil Service Department, Whitehall, London SW1A 2AZ. The text is also available on microfiche from the same address, price £0·75, cash with order.

Management Bookshelf

Women in Management

Miss F CULLEN, Civil Service Department

In the 19th century office work was a male preserve; nowadays almost two-and-a-half million women work in offices. They started out as telegraphists and copy typists and gradually progressed to clerical work, but very few have ever reached the higher echelons of management. Today there is considerable pressure to apply the equal opportunities legislation to enable women to develop careers on a par with men and to make fuller use of the country's workforce, both male and female. In this article I set out a selection of books and articles on the subject of women's entry into management.

General review

Much has been written about women and management. A good introduction to the literature is provided in *Women and Management: an expanding role;* edited by Donald O Jewell (Georgia State University; 1977; 413pp; £9·50). This contains a survey of the literature and a number of selected articles, including some specially commissioned for this book. Another useful report on the state of the art is *Women in Management;* edited by Bette Ann Stead (Prentice-Hall; 1978; 362pp; £9·45). This book carries a substantial bibliography, pp331-353. The central point made by most authors is, in the words of R L Dipboye, that in spite of the inceasing number of women entering occupations formerly the preserve of men, 'the management field has become one of the last frontiers of female liberation'. In 1970 less than 5 per cent of all managers in the United States were women, a remarkably small percentage since women constitute approximately 40 per cent of the total workforce.

Studies of women at work

Statistics of women at work are available from a wide range of official publications, all of which indicate that very few are managers. Although women represented 38 per cent of all United Kingdom employees in 1971, a negligible proportion were managers. The occupations in which women are most likely to become managers are the traditionally female ones—personnel work (31 per cent) and professional technical workers and artists (37 per cent) (OPCS; Census 1971; HMSO; 1975). A study by the Department of Employment, *Women and Work: A statistical survey* (HMSO; 1974; 70pp; £1·50) brings together from various sources a short general review of some of the main facts about women and work in Great Britain. More recently the

Department of Employment has published a paper by Catherine Hakim entitled *Occupational Segregation: a comparative study of the degree and pattern of the differentiation between men and women's work in Britain, the United States and other countries* (Department of Employment; 1979; 65pp; gratis). This study is primarily concerned with assessing changes in the level and pattern of men's and women's jobs before the introduction of the equal opportunities legislation.

In an article 'Why so few?' (*The Accountant,* Jan 25 1979, pp98-99) Lorraine Paddison outlines an 'action research project' currently being undertaken at Ashridge Management Centre. Ten organisations have been studied in depth to identify the factors which inhibit the movement of women into managerial positions. The research team is presently looking at means of making more effective use of women employees. Ellen Anderson asked a similar question 'Why aren't there more women in the boardroom?' in the November 1979 issue of *The Director,* pp62-63. She notes the main obstacles to advancement as 'women's acceptance of their traditional role in life as the only "natural one" and consequent lack of direction, purpose and career-mindedness, coupled with the barriers erected by male-dominated industry'. She goes on to argue that we should help women to achieve the self-confidence and ambition they so often lack and which they require to move through the ranks of management. The benefits will not only be those of social and legal justice but also a better use of economic resources. Recent developments in the United States are outlined in an article by John Thackray 'The Feminist Manager' (*Management Today*; April 1979; pp90-92, 96). American women are continuing to make progress, but victories have been neither spectacular nor conclusive. However it appears that the executive woman is on her way although there will be few around for some time as it takes some '20 years from the beginning of a corporate career until a person emerges as a power-holder'.

The percentage of enrolments of women at leading graduate business schools in the United States has begun to reflect the number of women in the educated population. The current range is from 17 per cent at Chicago University's School of Business Administration to 35 per cent at Columbia. This trend has been observed in the United Kingdom by Professor Cary Cooper and Barbara Lewis at the University of Manchester Institute of Science and Technology. A survey they carried out shows that an increasing number of women are taking university courses in management (*Management Today,* July 1979, pp47-48).

The Equal Opportunities Commission publishes a directory of current and recent research on women at work in the United Kingdom. This directory is published quarterly. The current issue (*EOC Research Bulletin,* vol 1, no 2, Spring 1979) lists 19 projects under professional and managerial careers.

In 1971 Michael Fogarty and others carried out a series of studies

which were part of a large project on women's problems and prospects in high-level professional and managerial jobs. These are published in *Women in Top Jobs* (Allen & Unwin; 1971; 328pp; £3·75) edited by M P Fogarty; *Sex, Career and Family*; by M P Fogarty and R and R Rapoport (Allen & Unwin; 1971; 581pp; £5·75); and *Dual Career Families*; by R and R Rapoport (Penguin; 1971; 329pp; £0·45). The final broadsheet of the project *Women and Top Jobs: the next move*; by M P Fogarty (PEP; 1972; 93pp; £1) discusses the family and career problems raised by the careers of highly qualified women and the practical action which should follow. An illustration of the type of action recommended is set out in the report of the committee on the *Employment of Women in the Civil Service* (HMSO; 1971; 48pp; £0·30). The committee made a number of recommendations on the employment of women and since then the Civil Service Department has been monitoring the progress which has been made in implementing them. *Civil Service Statistics 1975* (HMSO; 1975; pp12-19) up-dates some of the basic data about the employment of women in the Civil Service.

Blueprint for success

Even as legislation paves the way, and cultural barriers are slowly broken down, a practical, realistic guide to the skills that can make or break a career is always useful. Such a 'guide' is Margaret Fenn's *Making it in Management* (Olympic Learning; 1978; 177pp; £3·60). Nathanial Stewart's *The Effective Woman Manager* (Wiley; 1978; 219pp; £8·45) lists seven vital skills for upward mobility, such as planning, co-ordinating, debating, etc., commonly set out in management texts and equally applicable to men and women. Theodore T Herbert develops a strategy for action in 'Women as effective managers . . . a strategic model for overcoming the barriers' (*Human Resources Management,* Spring 1978, pp18-25).

Women at the top

The Managerial Woman; by Margaret Hennig and Anne Jardim (Marion Boyars; 1976; 221pp; £4·95) looks at 25 women who made it and contrasts the differences in the ways in which men and women who are managers view their jobs. Joan Wheeler-Bennet's *Women at the Top* (Peter Owen; 1977; 157pp; £5) examines the experiences of 15 women who achieved success and 65 highly qualified women who did not. The successful were less willing to accept as inevitable the limitations in career prospects imposed on them as a result of their roles as mothers and family women.

To end on a note of optimism it is worth remembering the words of Queen Elizabeth I: 'I know I have the body of a weak and feeble woman, but I have the heart and stomach of a king'.

New CSD Publications

This is a list of the documents recently issued by the Civil Service Department and its associated bodies. It includes material from the Central Computer and Telecommunications Agency, the Civil Service College, the Civil Service Commission, as well as from CSD itself.

These items may be examined in the Central Management Library, Civil Service Department, Old Admiralty Building, Whitehall, London SW1A 2AZ.

Unless otherwise stated, requests for copies should be sent to the Central Management Library, CSD, at the above address. HMSO publications may be ordered from PO Box 569, London SE1 9NH, from Government Bookshops, or through any bookseller.

Memorandum of Guidance for Officials Appearing Before Select Committees
1980; 24pp; gratis

Staff Inspection Code of Practice
1980; 7pp; gratis

A Study of Training Needs of HEO Unemployment Benefit Office Managers, by R Williams (CSD) and M Wood and B Lawson (Dept of Employment) 1980; 25pp; gratis

Central Computer and Telecommunications Agency

Government Computer Topics
Issue No. 23; April 1980; gratis

New Office Technology in the Civil Service, by R F Goodman, A E Smith and E Conn
1980; 16pp; gratis

Review of Investment Appraisal and Monitoring Procedures for Administrative Computer Projects: report by the Investment Appraisal Working Party
1980; 33pp; £2·00; ISBN: 0 7115 0020 7

System Structuring Using Minicomputers
1980; 88pp; £0·75 (microfiche only); ISBN: 0 7115 0021 5

Civil Service College

Characteristics Required in Tomorrow's Public Servants, by D R Lewis
1980; 12pp; gratis
CSC Working Paper No. 20

Decision-Making in the European Community: an exercise, by A Erridge
1980; 82pp; £2·00; ISBN: 0 7115 0017 7

Improving Policy Analysis in DHSS, by E J Razzell
1980; 18pp; gratis
CSC Working Paper No. 19

Main Series of Courses and Seminars: Programme September 1980-August 1981
1980; 204pp; gratis; ISBN: 0143-1919

Ninth Annual Report by the Principal to the Civil Service College Advisory Council: September 1978-August 1979
1980; 59pp; gratis; ISSN: 0305-9634

Policies for the 16-19 Year Olds: an overview, by J Nixon
1980; 44pp; gratis
CSC Working Paper No. 18

A Selection of Courses and Seminars: Autumn Term, September-December 1980
1980; 2pp; gratis; ISSN: 0143-1447

Civil Service Council for Further Education

Report 1978/79 to the National Whitley Council
1980; 8pp; gratis

Some recently published titles received by the editor

An introduction to business accounting for managers, by W C F Hartley. Pergamon Press Limited. 220pp. £10·50 (hardback), £4·95 (flexiback).

The Central Government of Britain. Central Office of Information Reference Pamphlet 40. HMSO. £2·25.

New forms of work organisation, Volume 2. International Labour Office, Geneva. £6·25.

A History of the Export Credits Guarantee Department Export Credits Guarantee Department. 67pp. Gratis.

Reason by numbers. Penguin Books Limited (Pelican Library of Business and Management) 406pp. £1·95 (paperback).

Opportunities. E de Bono. Penguin Books Limited. £1·25

Planning for improved enterprise performance. International Labour Office (Managment Development Series No. 15). 178pp. £5·00

Management in Government. Edited by B C Mathur, K Diesh and C Chandra Sekharan. Indian Ministry of Information and Broadcasting. 433pp. £7·50.

Letter to the Editor

The views expressed in Letters to the Editor are the writers' own, and not necessarily those of their departments.

Dear Sir,

The article on stocktaking which appeared in your February 1980 edition is an interesting addition to the literature on stock management. In offering a criticism of it I suspect I may run the risk of emulating the scientist who 'proved' that the bumble-bee cannot possibly fly, and present apparently sound theoretical objections only to have them confounded by successful practical application. Three major doubts trouble me however.

The authors make the point that stocktaking may occur for a number of reasons and indicate that the procedure they are offering is designed to confirm the accuracy of the stock record. They state that it is 'essential that what the stock record says is on the shelf actually is there'! The implication of this is that either the credibility or the real effectiveness of the supply system or both depend on accurate stock records. Credibility is a policy matter. Management can decide how much they are prepared to spend to be credible and assess whether that amount of money can produce the level of accuracy necessary for credibility. If it cannot then stocktaking for credibility reasons is pointless. If effectiveness of the system is the objective then it must be pointed out that stock record accuracy is only one of several factors contributing to effectiveness. Design and operation of the stock control system may be far more significant, as may the general operating environment. In general stock control procedures and stocktaking are complementary. With perfect stock control stocktaking should not be necessary so it may be better to apply the effort to improving stock control rather than stocktaking. What this amounts to is 'are you solving the right problem?'

Supposing for the moment that the right problem has been identified the next question is whether the method of solution is likely to be suitable. In the absence of detailed information about the system the most obvious way of answering this question is to compare the problem presented with the problem which the quality control procedure used is designed to solve. The authors have recognised the differences but it is worth spelling them out. The quality control system is designed to operate in a situation where individual errors are uniquely and absolutely recognised in the sample and remain errors unless action is taken to rectify them. Thus a tin can say, is checked against a standard which cannot be wrong and either passes or fails. Once it has failed you can keep it as long as you like but it will never become a pass unless it is repaired. The stock system is very different. There are three variables; what should be on the shelf, what is on the shelf, and what the paperwork says is on the shelf and though one may argue that what is on the shelf can be defined as the standard it is, like the other two, a variable which can move either up or down in practice. The complexity of this system makes errors difficult to determine uniquely but more significantly it makes it possible for there to be advantage in not checking. By waiting errors may cancel out. The double sampling system goes some way toward allowing for this fact but does not cover the full checks which are triggered by the first sample alone and which may not be needed. Many stock systems contain self-correcting errors for sound practical reasons.

The most worrying aspect of the work however is its failure to consider the relationship between stocktaking and stock control. Though there are many different forms of stock control the underlying principles are generally similar. Stock behaves much like a flywheel on an engine. The engine supplies energy to the flywheel by means of relatively few, large and generally regular inputs. Energy is drawn off more or less continually in much smaller amounts which are unpredictable both in size, number and timing. The same applies to stock control. There are frequent demands and few replenishments generally and this results in the 'saw tooth' pattern of figure 1 below. Replenishment of the warehouse is usually triggered either by the attainment of a particular stock level or date. Because of uncertainty in demand it is usual to carry a reserve or safety stock which guards against a stockout between re-ordering and replenishment. The most effective time to sample in such a system would be immediately prior to re-order; other random samples taken during the cycle may well be wasted because when stocks are high there is no danger of a stockout anyway and once the re-order is placed there is little scope for adjustment without incurring extra expense. Only in the rather specialised systems where replenishments are almost as frequent as demands or demand is very infrequent would random sampling seem valid and one is still tempted to feel that efficient stock control would be more cost effective than distributed stocktaking. In any system where large reserve stock has to be carried stocktaking errors probably do not matter unless it can be shown that there is systematic error (steadily increasing or decreasing stock, or consistently higher or

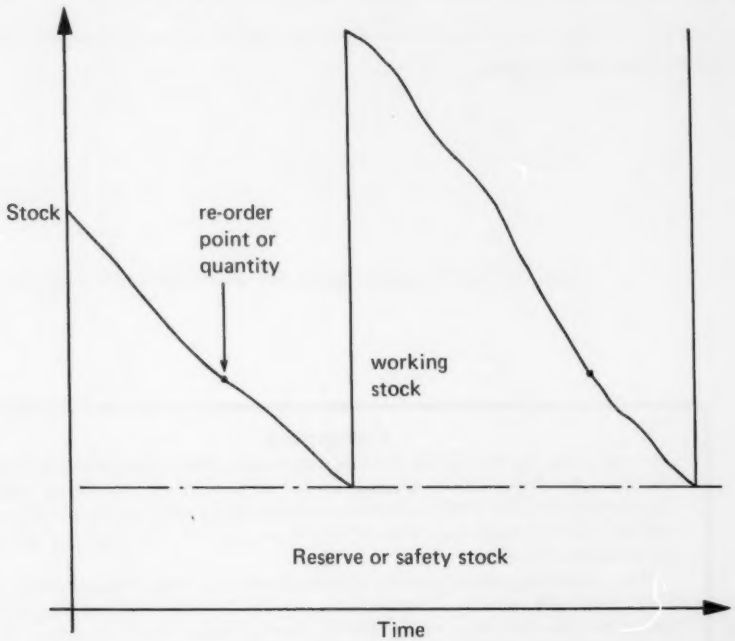

Fig. 1

lower stock than on paper). In such circumstances I suspect that there would be a more cost-effective way of spotting the discrepancy and correcting it, for example by periodic sampling to test for trends in stock levels out of line with paper stock or demand, or perhaps by doing no stocktaking on less vital items and keeping a check on the number of stockouts as an indication of error rate.

Roy C Riddett
Operational Research Division
Civil Service Department

Corrigendum

We wish to apologise to Colm Lincoln, the author of the article *Watch-dog at the Window: the Public Service Advisory Council in the Irish Public Service* which appeared in the May 1980 issue of this journal, for reproducing incorrectly the second sentence of the quotation at the top of page 71. This sentence should have read as follows—

'We, therefore, recommend the establishment of a Public Service Advisory Council of eight persons—four from the private sector, three from the public sector and the Secretary of the Public Service Department—to survey the progress of the reorganisation of the public service.'

Printed in England for Her Majesty's Stationery Office
by The Campfield Press, St. Albans
Dd 698161 K36 7/80

Supplement to

Management Services in Government

August 1980 Volume 35 Number 3

Computer Installations for Government Departments

Civil Service Department
Central Computer
and Telecommunications Agency

Contents *page*

Computers for administrative and general purposes installed in departments as at 31st December 1979 3

Computers for administrative and general purposes on order as at 1st January 1980 11

Computers for scientific and technical purposes installed in departments as at 31st December 1979 12

Computers for scientific and technical purposes on order as at 1st January 1980 24

Key to abbreviations used 25

Preface

Information about computers used by government departments for administrative and general, and scientific and technical purposes is usually published annually with the May issue of *Management Services in Government*. Exceptionally, it is on this occasion published with the August edition. Particulars of further orders are given in other quarterly editions.

Details of computers for administrative and general purposes installed and on order at 1st January 1980 are shown in Tables 1A and 1B, and similar information about computers for scientific and technical purposes is given at Tables 2A and 2B. Computers for scientific control systems and flight simulators are not included.

A computer for inclusion in these tables must:

(*a*) Operate under stored program control and use wholly digital representation.
(*b*) Cost at least £10,000.
(*c*) Not form part of processor-controlled keying equipment.

The total of computers installed for administrative and general purposes is 215, and a further 13 are on order. Corresponding figures for computers installed for scientific and technical purposes are 399 and 22.

Keys to the abbreviations used under 'Department' (*column* 2) and 'Manufacturer' (*column* 5) are included at the last page.

The information contained in this supplement is provided by the Central Computer and Telecommunications Agency. Inquiries should be addressed to Publications and Information Branch, CT(S), Central Computer and Telecommunications Agency, Riverwalk House, 157-161 Millbank, London SW1P 4RT.

1A Computers for administrative and general purposes installed in departments as at 31st December 1979

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
December 1964	ECGD	London	Statistics and accounts	IBM 1401G
February 1967	Defence (PE)	Glascoed	Production control	NCR 500
April 1967	Defence (PE)	Glascoed	Production control	NCR 500
July 1968	PGO	Crawley	Pension payments and banking	ICL 4/50
January 1969	Defence (PE)	Glascoed	Production control	2 × NCR 500
February 1969	Scottish Office	Edinburgh	Vote accounting payments	NCR 500
February/May 1969	DHSS	Newcastle	Pension payments, pay and statistics, family allowances	2 × ICL 4/70
May 1969	Defence (Army)	Donnington	Stock control	ICL 1901
May 1969	CSD	Norwich	Bureau work	ICL 1907F
June 1969	DHSS	Newcastle	Short-term benefits reconciliation	ICL 1901
September 1969	Defence (Central)	Hullavington	Stores codification and cataloguing	ICL 1904E
February 1970	Defence (Central)	Cheadle Hulme	Industrial civil pay and records	ICL 1904E
May 1970	Defence (Army)	Shrivenham	Instruction and research	ICL 1903A
February 1971	Defence (PE)	Chorley	Royal Ordnance Factories bureau	ICL 1902T
February 1971	Defence (Air)	Swanton Morley	Analysis of technical maintenance data	ICL 1904S
March 1971	Defence (Central)	Bath	Non-industrial civil pay and records	ICL 1904A
March 1971	Inland Revenue	Worthing	PRISM and statistics	ICL 1904A (Second-hand)
March 1971	Inland Revenue	Liverpool	Sub-contractor's scheme	ICL 1904A
April 1971	Defence (Air)	Northwood	Evaluation and research	ICL 1903A
May 1971	Transport	Swansea	Vehicle registration and licensing; driver licensing	ICL 4/70
June 1971	PGO	Crawley	Banking and pensions work	ICL 4/50
September 1971	Defence (Air)	Carlisle	Stores, stock control	ICL 1903A

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
October 1971	Trade	Newport	Trade census statistics and Business Statistics Office	ICL 1906A
October 1971	Defence (Navy)	Rosyth	Naval Base bureau service	ICL 1904A
December 1971	Defence (Navy)	Chatham	Navy Base bureau service	ICL 1904A
December 1971	Defence (Army)	Bicester	Stock control	ICL 1906A
February 1972	DHSS	Newcastle	Contribution records and graduated pensions	ICL 1906A
February 1972	Defence (Navy)	Devonport	Naval Base bureau service	ICL 1904A
February 1972	Inland Revenue	Worthing	PRISM and pay	ICL 1904A
February 1972	Defence (Army)	Berlin	Provisioning and stock control	ICL 1902A
April 1972	ECGD	London	Statistics, accounts, bank guarantees and long-term credits	IBM1401B (Second-hand)
May 1972	Defence (Central)	London	Ministry of Defence HQ bureau	ICL 1907F
May 1972	Defence (Air)	Stafford	Stores, stock control	ICL 1903A
July 1972	Defence (Air)	High Wycombe	General ADP	ICL 1904S
July 1972	Home Office	Hendon	Police records	2 × Burroughs B6700
August 1972	Defence (Army)	Viersen	Stock control	ICL 1902S
August 1972	Defence (Navy)	Ensleigh	General naval stores system	ICL 1906A
August 1972	DHSS	Newcastle	Contribution records and graduated pensions	ICL 1906A
August 1972	Customs and Excise	Southend	Value Added Tax	ICL 4/72
August 1972	PWLB	London	Loan repayments	ICL 1901A
September 1972	Defence (Navy)	Faslane	Stock control	ICL 1903A
October 1972	Defence (Air)	Hendon	Stores	2 × ICL 4/72
October 1972	National Savings	Glasgow	Savings Bank	ICL 4/72
October 1972	National Savings	Lytham St. Annes	Premium Bond prize draw	2 × Honeywell 316
November 1972	Customs and Excise	Manchester	Betting duty control	BC(S) L Molecular 18
December 1972	Transport	Swansea	Vehicle registration and licensing; driver licensing	ICL 4/72
1972	Defence (PE)	Glascoed	Production control	2 × NCR 500

January 1973	HO and Met. Pol.	London	Pay and statistics; traffic tickets; prison records	ICL 1904A
February 1973	Transport	Swansea	Cheque reading and sorting for central licensing system	IBM System 3
March 1973	CSD	Chessington	Payroll accounting and staff records	ICL 1904S
March 1973	Defence (Air)	Hendon	Stores	ICL 4/72
March 1973	Environment	Hastings	Integrated accounting process	ICL 1906A
March 1973	Customs and Excise	Southend	Cheque reading and sorting for VAT scheme	IBM System 3
May 1973	CSD	Chessington	Civil Service personnel information retrieval and statistics (PRISM)	ICL 1904S
June 1973	Land Registry	Plymouth	Index of land charges	IBM 370/145
August 1973	DHSS	Reading	Unemployment benefit payments	2 × ICL 1904S
September 1973	DHSS	Newcastle	Graduated pensions records	ICL 1906A
October 1973	Transport	Swansea	Vehicle registration and licensing, driver licensing	ICL 4/72
October 1973	Cabinet Office/ Treasury	London	Econometrical modelling, statistical research and progress development	Univac 1106
October 1973	British Museum	London	Information retrieval	HP 2100A
December 1973	Inland Revenue	East Kilbride	PAYE assessing for Scotland	ICL 1904A
December 1973	National Savings	Lytham St. Annes	Premium Savings Bonds and Stocks	ICL 4/72
January 1974	Defence (Army)	Worthy Down	Pay and records of Army personnel	IBM 370/158
February 1974	Defence (Army)	Larkhill	Computer appreciation and elementary programming	Ferranti Argus 100E
March 1974	Defence (Central)	Bath	Pensions and accounts	ICL 1903T
June 1974	Defence (Army)	Hong Kong	Stores provisioning and stock control	ICL 1902A
June 1974	Customs and Excise	London	Tariff quota control	Dogico Micro 16V
July 1974	DHSS	Fleetwood	Health Service superannuation duties and general departmental work for Blackpool Central Office	ICL 1904S
August 1974	National Savings	Glasgow	Savings Bank	ICL 4/72

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
September 1974	Defence (Army)	Woolwich	REME maintenance data and REME reliability studies	ICL 1904S
October 1974	Environment	Hastings	Payroll, etc.	ICL 1904S
November 1974	DHSS	Newcastle	Pensions statistics and family allowances	ICL 4/72
November 1974	Defence (Air)	Kinloss	Aircraft servicing	ICL 2903
November 1974	Home Office	Hendon	Police records	Burroughs B6700
December 1974	Environment	Croydon	Architectural applications	DG Nova and Tektronix
January 1975	CSD	London	Bureau and PRISM	EAL Spacer
January 1975	Defence (PE)	Portsmouth	General ADP	Honeywell 61/58
March 1975	DES	Darlington	Educational statistics	ICL 1906A
March 1975	F & CO	London	Accommodation and services; bill paying and accounts; library	Olivetti DE 523 × 2
April 1975	Defence (Air)	Benson	Management of Electrical Engineering Instructions	ICL 2903
April 1975	Defence (Air)	Innsworth	Airmen's pay and records	Univac 1106
May 1975	Defence (Air)	St. Athan	Planning and control of aircraft servicing	ICL 2903
May 1975	Defence (Air)	Kemble	Planning and control of aircraft servicing	ICL 2903
May 1975	Defence (Air)	Abingdon	Planning and control of aircraft servicing	ICL 2903
June 1975	National Savings	Durham	Savings Certificates, urgent stream repayments	BC(S)L Molecular 18
June 1975	MAFF	Guildford	Bureau work	ICL 1904S
June 1975	Defence (Air)	Harrogate	Logistic control	ICL 2903
June 1975	OPCS	Titchfield	Population census and survey analysis	ICL 1906S
June 1975	Defence (PE)	St. Mary Cray	Processing and control of technical literature	GEC 40/80
June 1975	Home Office	Havant	Development of Dorset MIS	DEC PDP 11/35
July 1975	Defence (Navy)	Chatham	Production control	2 × Ventek 2200
July 1975	Defence (Navy)	Devonport	Production control	2 × Ventek 2200
July 1975	Defence (Navy)	Portsmouth	Production control	2 × Ventek 2200
July 1975	Defence (Navy)	Rosyth	Production control	2 × Ventek 2200

July 1975	Defence (Central)	Hullavington	Stores codification and cataloguing	2 × ICL 1904E
July 1975	Defence (Navy)	Eaglescliffe	Stores, stock control	Univac 494
September 1975	Defence (PE)	Bath	Design, procurement, support	DEC PDP 11/50
September 1975	Ordnance Survey	Southampton	General purpose, administration and cartogaphic	ICL 1906S
September 1975	Customs and Excise	Southend	Value Added Tax	ICL 4/72
September 1975	Defence (Navy)	Copenacre	Stock control	Univac 494
September 1975	Employment	Runcorn	Pay and statistics	ICL 1904S
November 1975	Environment	London	Financial statistics	ICL 1903A
December 1975	Defence (Navy)	Portsmouth	Naval Base bureau service	ICL 1904S
December 1975	F & CO	Cheltenham	Bureau, F & CO payroll	IBM System 360
1975	Industry	St. Mary Cray	Retrieval, stock control, index production	BC(S)L Molecular 18 Mk III
January 1976	Customs and Excise	Southend	Statistics	ICL 4/72
February 1976	MAFF	Cambridge	Crop variety trials	CTL Modular I
March 1976	Customs and Excise	Lytham St. Annes	Import duty deposit repayments	ICL Singer 1500
March 1976	DHSS	Newcastle	Contribution recording and benefit system	Grafix I
March 1976	Home Office	Corby	Supply and transport, stock control and statistics	MBM 7000
April 1976	MAFF	Guildford	Subsidy payments, payroll, statistics	ICL 1904S
April 1976	HO and Met. Pol.	London	Pay and statistics	ICL 1904S
June 1976	Defence (PE)	Nottingham	Production control, costing, payroll	ICL 2904
June 1976	Defence (Navy)	Gosport	Pay and records	ICL 1904A
June 1976	Transport	Swansea	Cheque reading and sorting	IBM System 3
July 1976	Defence (Air)	Innsworth	Pay and records	ICL 2970
July 1976	Environment	Croydon	Text editing	Ventek 1104
July 1976	ECGD	Cardiff	Statistics; accounts; bank guarantees; long-term credits	IBM 370/135
July 1976	Defence (Air)	High Wycombe	Command and control tasks	ICL 2903
August 1976	GRO (Scotland)	Edinburgh	Population statistics	ICL 1903A
August 1976	Defence (Army)	Rheindahlen	General ADP	ICL 1902S
September 1976	British Museum	London	Data collection and cataloguing	Varian V72
September 1976	DHSS	Reading	Unemployment benefit payments	ICL 1904S
September 1976	Defence (Navy)	Llangennech	Stores accounting	IBM 370/115

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
October 1976	Defence (Army)	Wilton	Operational plans	CTL MOD I
October 1976	Royal Mint	Glamorgan	Metal accounts; payroll; sales invoices and payments; general accounting, mail order fulfilment	ICL Singer 10
November 1976	Defence (Navy)	Devizes	Bureau West	ICL 2980
November 1976	DHSS	Livingston	Unemployment benefits	2 × ICL 1904S
November 1976	Cabinet Office/ Treasury	London	Econometric modelling, statistical records and progress development	Univac 1106
November 1976	Defence (Central)	Cheadle Hulme	Civilian pay and records	ICL 1903T
November 1976	Employment	Runcorn	Pay, statistics, Professional and Executive Register	ICL 1904S
December 1976	Industry	Eastcote	General ADP	ICL 1904S
December 1976	Energy	London	Oil well log analysis	2 × Wang 2200VP; Wang 2200T
1976	Defence (Army)	Larkhill	Computer appreciation	Varian 620L
1976	Industry	Teddington	Editing	DEC PDP 11/40
January 1977	Customs and Excise	Southend	On-line and batch CPT development	ICL 4/70
February 1977	PGO	Crawley	MICR control	IBM 370/115
March 1977	Inland Revenue	Liverpool	PAYE on-line pilot study	Honeywell 716
March 1977	Defence (Air)	Bracknell	Library service	DEC PDP 11/34
March 1977	Defence (Central)	London	Army manpower statistics	Prime 300
April 1977	PGO	Crawley	Pensions payments and banking	ICL 2970
May 1977	Defence (Air)	Sealand	Avionic direct exchange scheme	DEC PDP 11/35
May 1977	Defence (Air)	Hendon	Stores control	ICL 4/72
June 1977	Inland Revenue	Cumbernauld	Tax collection, accounting and CT assessing	ICL 2970
July 1977	PGO	Crawley	MICR control	IBM 370/115
August 1977	MSC	London	Message switch	Interdata 6/16
September 1977	DHSS	Livingston	Unemployment benefits	ICL 1904S
October 1977	Defence (PE)	Chorley	Production control, costing, payroll	ICL 1903T
October 1977	HO and Met. Pol.	London	Pay and statistics	ICL 1904S
October 1977	DHSS	Newcastle	Pensions and payroll projects	ICL 2980
October 1977	HO and Met. Pol.	London	Pay and statistics	ICL 1905S
November 1977	DHSS	London	Provision of medical manpower statistics	ICL 2903

December 1977	Transport	Hemel Hempstead	Road accident statistics	ICL 2903
January 1978	Industry	East Kilbride	Central computing service	Univac 1100/21
February 1978	Industry	East Kilbride	Signal controller between mainframes microsystem and data communication	DEC PDP 11/03
February 1978	Defence (Army)	Bicester	Stock control	ICL 1904S
March 1978	PGO	Crawley	Pensions payments and banking	ICL 2976
March 1978	MSC	Portsmouth	Jobscan	GA 16/440
March 1978	Scottish Office	Edinburgh	General ADP in Scotland	IBM 370/148
March 1978	Home Office	Hendon	Police records	Burroughs Triple 7700
March 1978	CSD	Norwich	Management accounting for HMSO, and general purpose	ICL 2976
March 1978	Defence (Air)	Swanton Morley	Planning and control	ICL 4120
April 1978	Employment	Watford	Stores accounting	CMC Reality/Royale
April 1978	Home Office	London	Traffic data collection, software development	DEC PDP 11/34
Aprii 1978	Defence (Army)	Chilwell	Stock control	ICL 2903
April 1978	Defence (Army)	Malvern	Data analysis	ICL 2903
April 1978	Defence (Navy)	Devizes	Bureau administrative operations	ICL 2980
April 1978	DHSS	Washington	Child benefit statistics	ICL 2980
May 1978	Defence (Army)	Malvern	Defects and modification records, MIS, tax editing	ICL 2903
May 1978	Defence (Air)	High Wycombe	System analysis	ICL 2904
June 1978	Inland Revenue	Shipley	Tax collection, accounting and CT assessing	ICL 2970
June 1978	Defence (PE)	Bath	Computer-aided design	DEC PDP 11/55
July 1978	Defence (Central)	Liverpool	Bill paying and accounts	ICL 1902T
August 1978	Environment	Hastings	Payroll	ICL 1904S
August 1978	Environment	Croydon	Building design	Tektronix 4014-1
September 1978	Defence (Army)	Worthy Down	Pay and records	IBM 3031
December 1978	Home Office	Stafford	Information retrieval	Ferranti Argus 700

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
January 1979	Scottish Office	Edinburgh	General administrative computing	IBM 3032
February 1979	CSD	Norwich	Bureau machine	ICL 2960
February 1979	DHSS	Newcastle	NI contribution records, benefit records	ICL 2980 × 2
March 1979	Employment (MSC)	London	Stores accounting	CMC Reality/Royale
March 1979	Cabinet Office (CSO)	London	Econometric modelling, financial information system	Univac 1100/12
June 1979	Customs and Excise	London	Operational research	Nord 1226
July 1979	Industry	Teddington	General ADP	ICL 2972
August 1979	MAFF	Lowestoft	Fish statistics, fisheries research	DG Nova 3/12
August 1979	Defence (Army)	Bicester	Order issue and stock control	ICL 2904
August 1979	Defence (Navy)	Bath	Information capture/retrieval system	CMC Reality/Royale
September 1979	GAD	London	Pension calculations for Government and external uses	Ventak Datapoint 1802
October 1979	Defence (Navy)	Devizes	Bureau work	ICL 2976
October 1979	PWLB	London	Administrative processing of loans to local authorities	HIS M33
November 1979	Environment	Hastings	Payroll, accounting and supplies	ICL 2960 × 2
December 1979	CSD (CCTA)	London	Program development	MCZ ZILOG Microcomputer
December 1979	Employment (MSC)	Sheffield	Development machine	Perkin Elmer 3220
December 1979	DHSS	North Fylde	NHS Superannuation and statistics	ICL 1904S
December 1979	DHSS	North Fylde	Social security payments	ICL 1904A
December 1979	DHSS	Manchester	Records and payments	ICL 2960/10

1B Computers for administrative and general purposes on order as at 1st January 1980

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
January 1979	Home Office	London	Pay and statistics	ICL 1904S
March 1979	National Savings	Lytham St. Annes	Bonds and stocks	ICL 2976
March 1979	National Savings	Glasgow	National Savings	Dual ICL 2972
March 1979	HMSO	London	Distribution of publications	HP 3000 Series III
April 1979	Defence (Navy)	Ensleigh	Cost modelling	HP 9845S
July 1979	Defence (Navy)	Portsmouth	Production control data	CTL 8040
August 1979	MAFF	Guildford	Front end processor	GEC 40/85
August 1979	Defence (Central)	Cheadle Hulme	Defence industrial pay system	ICL 2960/10
September 1979	Defence (PE)	Chertsey	Project management information system	HP 1000
November 1979	Defence (Navy)	Bath	Data logging	Prime 550
December 1979	Customs and Excise	Southend	Trade statistics	Datagraphics COM system
December 1979	Industry	Eastcote	Communications	ICL 7903
December 1979	Energy	London	Economics and statistics	IBM Minicomputer

2A Computers for scientific and technical purposes installed in departments as at 31st December 1979

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
April 1962	Defence (Army)	Arborfield	Training and research	ICL 803B
May 1964	Defence (PE)	Christchurch	Laboratory data research	Elliott 920A
August 1964	Industry	Teddington	Scientific calculations	ICL KDF9
January 1965	Defence (Navy)	Teddington	Mathematical applications	ICL KDF9
November 1965	Industry	Teddington	Display research and spectrometry	Elliott 903B
December 1965-66	Defence (Army)	Slough	General scientific R & D	2 × Elliott 903
March 1966	Industry	Teddington	Programming research	ICL 4120
June 1966	Defence (PE)	Pyestock	General scientific research	DEC PDP 7
January 1967	Defence (Navy)	Alverstoke	On-line process control	DEC PDP 8S
January 1967	Defence (PE)	Christchurch	Laboratory data analysis	GEC Myriad
July 1967	Defence (PE)	Christchurch	Data reductions and general scientific research	ICL 4130
November 1967	Defence (PE)	Malvern	Data analysis	DEC PDP 9
November 1967	Defence (PE)	London	Data analysis	ICL 1901S
December 1967	Defence (PE)	Portsdown	Software development	Ferranti FM 1600
December 1967	Defence (PE)	Malvern	Production of mapping displays	DEC PDP 7
December 1967	Defence (Navy)	Alverstoke	Information retrieval system	DEC Link 8
January 1968	Defence (Air)	Farnborough	Data analysis	HP 2116B
February 1968	Industry	Teddington	On-line recording	DEC PDP 8
May 1968	Defence (PE)	Bedford	Data analysis	ICL 4130
October 1968	Industry	Cambridge	Development of computer-aided design facility	DEC PDP 9
October 1968	Defence (PE)	Malvern	Circuit research	ICL 4130
October 1968	Defence (PE)	Bramshott	General scientific research	HIS DDP 516
December 1968	Defence (PE)	Farnborough	System research	IBM 1130
December 1968	Defence (Army)	Eskmeals	Data analysis	Elliott 920B
Defence 1968	Defence (Navy)	Teddington	Real-time analysis of experiments	HP 2114

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1968	Defence (PE)	Bedford	Wind tunnel data	Digico Micro 16S
1968	Defence (PE)	Fort Halstead	Production control	ICL 4130
1968	Defence (PE)	Farnborough	Research	5 × Ferranti Argus 400
1968	Defence (PE)	Aldermaston	Laboratory data analysis	Ferranti Argus 300
1968	Defence (PE)	Aldermaston	Graphical display	Datagraph SD 4060
1968	Defence (PE)	Aldermaston	Data logging	DEC PDP 8
February 1969	Defence (PE)	Waltham Abbey	General scientific research	Elliott 903C (Second-hand)
March 1969	Industry	Teddington	Message switching research	HIS DDP 516
March 1969	DAFS	Aberdeen	Fishery research, data logging	Elliott 920G
April 1969	Industry	Teddington	Research	HIS DDP 516
July 1969	Industry	Teddington	Pattern processing research	HIS DDP 516
July 1969	Environment	Crowthorne	General scientific work and road research	ICL 4/70
July 1969	Defence (Army)	Shoeburyness	Data analysis	Elliott 920
July 1969	Defence (Air)	Farnborough	General-purpose computing	IBM 1130
September 1969	Industry	Teddington	Scientific research	ICL KDF 9
December 1969	Industry	Teddington	Communication control	HIS DDP 516
December 1969	Defence (Army)	Feltham	Geodetic computations and processing of digitized mapping	ICL 1902A
1969	Defence (PE)	Teddington	Data analysis	Ferranti FM 1600B
1969	Defence (PE)	Aldermaston	Mass spectrography	CTL Modular I
1969	Defence (PE)	Aldermaston	General scientific computing	3 × HIS DDP 516
1969	Defence (PE)	Aldermaston	Data logging	DEC PDP 8L
January 1970	Defence (PE)	Malvern	Development of Coral 66	CTL Modular I
January 1970	DHSS	Roehampton	Biomechanical research	Elliott 905
March 1970	Industry	Teddington	Display research and spectrometry	Elliott 905
May 1970	Defence (PE)	Bedford	Data analysis	ICL 4130
May 1970	Defence (PE)	Farnborough	General computing	IBM 1130
May 1970	Defence (PE)	Bedford	Wind tunnel data	HIS DDP 516
July 1970	Defence (Army)	London	Data analysis	Elliott 920

July 1970	Defence (Navy)	Teddington	Real-time analysis of experiments	HP 2116C
July 1970	Defence (Air)	Farnborough	Research	2 × Elliott 920
July 1970	Defence (Air)	Farnborough	Research	Redifon 2000A
July 1970	Defence (Air)	Farnborough	Research	DEC PDP 10
July 1970	Defence (PE)	Malvern	Data logging	DEC PDP 11/20
July 1970	Defence (PE)	Christchurch	Data processing	2 × CTL Modular 1
July 1970	Defence (PE)	Christchurch	Laboratory data analysis	HIS DDP 316
July 1970-71	Defence (Air)	Bedford	Research	3 × HIS DDP 516
September 1970	Defence (PE)	Malvern	Research	CTL Modular 1
September 1970	Defence (PE)	Dunfermline	Structure research	IBM 1130
October 1970	Defence (Navy)	Fareham	Electrical engineering training	IBM 1130
October 1970	Industry	Stevenage	Engineering computing	IBM 1130
December 1970	Environment	Croydon	Construction analysis design and research	IBM 1130
1970	MAFF	Lowestoft	Fisheries research	DEC PDP 8/L
1970	Defence (PE)	Fort Halstead	Data analysis	ICL 4013
1970	Defence (PE)	Malvern	Production of mapping displays	DEC PDP 8
1970	Defence (PE)	Farnborough	Process control	2 × DEC PDP 8/I
1970	Defence (PE)	Aldermaston	Laboratory data analysis	HIS DDP 516
January 1971	Industry	Teddington	Remote file storage	HIS DDP 516
February 1971	Industry	Teddington	Man/machine interaction research	2 × CTL Modular 1
March 1971	MAFF	Aberdeen	Data logging analysis, general scientific work	IBM 1130
April 1971	Defence (PE)	Boscombe Down	Flight data analysis	HIS DDP 516
May 1971	Forestry Commission	Farnham	General scientific computing	IBM 1130
July 1971	Defence (PE)	Farnborough	General program work	HIS DDP 316
September 1971	Industry	Feltham	Scientific applications	HIS DDP 316
November 1971	Defence (PE)	Portland	General scientific work	ICL 1904S
November 1971	Defence (PE)	Farnborough	General research	ICL 1904A
November 1971	Industry	Teddington	Wind tunnel instrumentation	HIS DDP 516
November 1971	Defence (Navy)	Portland	Research	GEC 905/928
December 1971	Defence (Air)	Farnborough	Research	Ferranti Argus 500L
December 1971	Defence (Air)	Farnborough	Research	2 × GEC 102
December 1971	Defence (Air)	Bracknell	Meteorolgical research and forecasting	IBM 360/195
1971	Defence (PE)	Holton Heath	On-line analysis of trials data	HP 2100A

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1971	Defence (PE)	Porton Down	General scientific computing	Digico Micro 16P
1971	Defence (PE)	Bedford	Research	HIS DDP 516
1971	Defence (PE)	Farnborough	Signals processing	HIS DDP 316
1971	Defence (PE)	Farnborough	Analysis of fatigue life research	MCS Mimic-1
1971	Defence (Navy)	Alverstoke	Process control	DEC PDP 8E
January 1972	Defence (PE)	Portsdown	General research	Elliott 905
January 1972	Defence (PE)	Westcott	Systems simulation	IBM 1130
January 1972	Defence (PE)	Farnborough	General scientific research	DG Nova 1200
January 1972	Defence (Navy)	Portsdown	Weapons research	GEC 905
January 1972/73	Defence (Army)	Holton Heath	On-line monitoring and analysis of trials	2 × HP 2100A
May 1972	Industry	Teddington	Disc file system	HIS DDP 516
May 1972	Industry	Teddington	Remote job entry	HP 2100
May 1972	Industry	Cambridge	Communications project	DEC PDP 11/20
June 1972	Industry	Teddington	Graphic editing	DEC PDP 11/20
June 1972	Environment	Crowthorne	Conversion of data from recording devices	HP 2100
June 1972	Defence (Army)	Shrivenham	Training and research	DEC PDP 11/20
August 1972	Defence (PE)	Farnborough	Data analysis	HP 2100A
August 1972	Defence (PE)	Westcott	Research analysis	DEC PDP 11/20
November 1972	DHSS	London	Computer-aided design/development in health buildings	Elliott 905
December 1972	Environment	Wallingford	Hydraulics research	ICL 1904S
1972	Defence (PE)	Bedford	Data analysis	HP 2100
1972	Defence (PE)	Fort Halstead	Data analysis	HP 2100
1972	Defence (PE)	Teddington	Real-time analysis of experiments	HP 2100S
1972	Defence (PE)	Teddington	Real-time analysis of experiments	DEC PDP 11/15
1972	Defence (PE)	Teddington	Real-time analysis of experiments	HP 2110A
1972	Defence (PE)	Teddington	Real-time analysis of experiments	HP 2116C
1972	Defence (PE)	Glen Fruin	Data logging	DEC PDP 8/E
1972	Defence (PE)	Bishopton	Data analysis	Digico Micro 16P

1972	Defence (PE)	Aberporth	Data logger	Ferranti FM 1600B
1972	Defence (PE)	Aberporth	Digitizing analogue data	Arcturus 18C
1972	Defence (Air)	Cosford	Electronics training	Digico Micro 16V
1972	Defence (PE)	Waltham Abbey	General scientific research	HIS DDP 316
1972	Defence (PE)	Farnborough	High-speed data link	DG Nova 1200
1972	Defence (PE)	Farnborough	Data logging and analysis	DG Nova 1200
February 1973	Defence (PE)	Malvern	Data analysis	DEC PDP 15/20
February 1973	Defence (PE)	Pyestock	Data analysis	DEC PDP 11/10
March 1973	Defence (PE)	Farnborough	Analysis of airworthiness data	HIS DDP 316
March 1973	DAFS	Aberdeen	Fishery research data logging	Elliott 905
March 1973	Defence (PE)	Farnborough	Computer-aided design	DEC GT 40
March 1973	Defence (Navy)	Alverstoke	Data analysis	DEC PDP 11/20
March 1973	Defence (Navy)	Alverstoke	Data analysis	DEC PDP 11/40
April 1973	Defence (Navy)	Dartmouth	Training	DEC PDP 8M
April 1973	MAFF	'RV Cirolane'	Fisheries research	HP 2100A, including Magnovox SAT-NAV system
May 1973	Defence (Central)	West Byfleet	Operational research	ICL 1904S
May 1973	Defence (PE)	Teddington	Computer-aided ship design	DEC PDP 11/45
May 1973	Defence (PE)	Bedford	Simulation	RX Sigma 8
June 1973	MAFF	Lowestoft	Fisheries research (shipboard work)	HP 2100A
August 1973	Defence (PE)	Boscombe Down	Data analysis	RX Sigma 6
October 1973	ODM	London	Mass spectrometer	DEC PDP 8E
November 1973	Defence (PE)	West Drayton	Ship machinery control	DEC PDP 11/45
November 1973	Defence (PE)	Farnborough	Research	DEC PDP 11/45
December 1973	Industry	Teddington	Experimental research information service	2 × CTL Modular I
1973	Defence (PE)	Teddington	Real-time analysis	HP 5451B
1973	Defence (PE)	Teddington	Data analysis	2 × DEC PDP 11/40
1973	Defence (PE)	Teddington	Data analysis	Elliott 903
1973	Defence (PE)	Dunfermline	Structure research	DEC PDP 11/15
1973	Defence (PE)	Portsdown	Computer-aided design	DEC PDP 8E
1973	Defence (PE)	Pyestock	Performance simulation	2 × EAL Racer 100
1973	Defence (PE)	Waltham Abbey	Data analysis	HP 2100A
1973	Defence (PE)	Bedford	Analysis of wind tunnel data	Digico Micro 16V
1973	Defence (PE)	Christchurch	Laboratory data analysis	DG Nova 820

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1973	Defence (PE)	Christchurch	Research	DEC PDP 11/40
1973	Defence (PE)	Farnborough	Data analysis	3 × DEC PDP 11/10
1973	Defence (PE)	Farnborough	Communications control	Gen. Radio 1923A
1973	Defence (PE)	Farnborough	Process control	2 × DEC PDP 8E
1973	Defence (PE)	Farnborough	Fourier analysis	HP 2100A
1973	Defence (PE)	Farnborough	Plant control and data logging	DEC PDP 11/05
1973	Defence (PE)	Aldermaston	Laboratory data analysis	5 × Comp. Auto. Alpha 16
1973	Defence (PE)	Aldermaston	Laboratory data analysis	DEC PDP 12/30
1973	Defence (PE)	Aldermaston	General scientific computing	DEC PDP 11/40
1973	Defence (Army)	Blandford	Training	2 × Arcturus 18D
February 1974	Employment	Sheffield	General research	2 × DEC PDP 8F
February 1974	Defence (Army)	Blandford	Signals training	2 × HP 3000
March 1974	Industry	Cambridge	Design research	Prime 300
March 1974	Industry	Cambridge	Design research	DEC PDP 11/20
March 1974	Industry	Teddington	Marine research	HIS DDP 516
March 1974	Defence (Navy)	Cobham	Data analysis	Varian V72
April 1974	Defence (Navy)	Collingwood	Engineering training	DEC PDP 8F
April 1974	Defence (PE)	Bedford	Wind tunnel analysis	DEC PDP 11/20
April 1974	Defence (PE)	Farnborough	Research	DEC PDP 11/40
May 1974	Defence (PE)	Fort Halstead	Data analysis	ICL 1906A
June 1974	Defence (Air)	Bracknell	Meteorological research and forecasting	DEC PDP 11/40
July 1974	Defence (PE)	Westcott	General scientific research	ICL 1904S
August 1974	Defence (PE)	Chertsey	Vehicle research	ICL 1903T
August 1974	Defence (PE)	Coulport	Scientific research	CTL Modular I
September 1974	Defence (PE)	Farnborough	General computing	ICL 1906S
September 1974	Defence (Army)	Hebrides	Range safety data analysis	Ferranti FM 1600B
October 1974	Defence (Army)	Shrivenham	Training and research	DEC PDP 11/20B
December 1974	Industry	Teddington	Printing/drawing	DEC PDP 11/50
1974	Defence (PE)	West Drayton	Modelling and analysis	DEC PDP 11/40
1974	Defence (PE)	Teddington	Real-time analysis	HP 2100S

1974	Defence (PE)	Teddington	Data analysis	DEC PDP 11/35
1974	Defence (PE)	Holton Heath	On-line analysis	HP 2100S
1974	Defence (PE)	Portsdown	Data logging	DEC PDP 11/05
1974	Defence (PE)	Portsdown	Data logging	Texas 980A
1974	Defence (PE)	Aberporth	Data analysis	ABS Multibus
1974	Defence (PE)	Farnborough	Process control	DEC GT44
1974	Defence (PE)	Farnborough	Communications control	DEC PDP 8/E
1974	Defence (PE)	Farnborough	Signals processing	CTL Satellite I
1974	Defence (PE)	Aldermaston	Analysis of research data	DEC PDP 8/E
1974	Defence (PE)	Aldermaston	General scientific computing	IBM 370/168
January 1975	Defence (PE)	Locking	Data logging	Digico Micro 16V
January 1975	Defence (Air)	Bracknell	Training	ICL 4130
February 1975	Defence (Air)	Shoeburyness	Meteorological research and forecasting	IBM 370/158
February 1975	Defence (PE)	Lowestoft	Data analysis	Interdata M8/32
February 1975	MAFF	Wye	Fisheries research (land-based work)	HP 21MX-E
March 1975	MAFF	Glasgow	Amino acid analysis	Digico Micro 16V
March 1975	Home Office	Sheffield	Police command and control system	Ferranti Argus 500
March 1975	Employment	Manadon	General research	RX Sigma 6
March 1975	Defence (Navy)	London	Training of engineering officers	RX Sigma 6
	Home Office		Allocation of frequencies for mobile and private radios	CDC 17
March 1975	Defence (PE)	Malvern	Development of Coral 66	GEC 4080
March 1975	Environment	Reading	Hydrometric data processing	ICL 1904S
March 1975	Defence (PE)	Bedford	Wind tunnel data acquisition analysis	DEC PDP 11/40
April 1975	Industry	East Kilbride	Engineering research	Ferranti Argus 700s
April 1975	Industry	East Kilbride	Engineering research	Ferranti Argus 700T2
April 1975	Defence (PE)	Porton Down	On-line data analysis	Varian 620/L
May 1975	Employment	Sheffield	General research	DEC PDP 11/10
June 1975	Defence (PE)	Chertsey	Vehicle research	Interdata M70
June 1975	Industry	Cambridge	Design research	Prime 300
July 1975	Defence (Army)	Shrivenham	Training and research	DEC PDP 11/40
July 1975	Defence (PE)	Farnborough	Graphic facility for computer users	DEC PDP 11/40
July 1975	Home Office	Kidlington	Police intelligence data	Honeywell 6060
August 1975	Defence (Army)	London	Data analysis	GEC 40/80

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
August 1975	Defence (PE)	Farnborough	General scientific research	DEC PDP 11/45
December 1975	Defence (Central)	West Byfleet	Operational research	ICL 2970
1975	Defence (Navy)	Manadon	Graphics	Imlac PDS-4
1975	Defence (PE)	Teddington	Real-time analysis	DEC PDP 11/35
1975	Defence (PE)	Teddington	Real-time analysis	CTL Modular I
1975	Defence (PE)	Teddington	Analysis and software development	2 × HP 2100S
1975	Defence (PE)	Teddington	Data analysis	HP 2100A
1975	Defence (PE)	Teddington	Engineering inspection of components	DEC PDP 8/E
1975	Defence (PE)	Teddington	Process control	DEC PDP 8/J
1975	Defence (PE)	Holton Heath	On-line analysis	DEC PDP 11/05
1975	Defence (PE)	Portsdown	Computer-aided design	Imlac PDS-4
1975	Defence (PE)	Portsdown	Data logging	DEC PDP 11/40
1975	Defence (PE)	Chertsey	Analysis of data	DG Nova 1220
1975	Defence (PE)	Aberporth	Data logging	Varian V71
1975	Defence (PE)	Bedford	Data analysis	HIS DDP 316
1975	Defence (PE)	Bramshot	Processing test data	HIS DDP 516
1975	Defence (PE)	Fort Halstead	Data analysis	DG Nova 820
1975	Defence (PE)	Fort Halstead	Data analysis	HIS DDP 316
1975	Defence (PE)	Malvern	Interactive graphics	DEC XVM 200
1975	Defence (PE)	Malvern	Data analysis	2 × DG Nova 2/10
1975	Defence (PE)	Malvern	Software development	DEC 10
1975	Defence (PE)	Bedford	Data analysis	HIS DDP 316
1975	Defence (PE)	Farnborough	Process control	3 × DEC PDP 11/40
1975	Defence (PE)	Farnborough	Production control	DEC PDP 8F
1975	Defence (PE)	Farnborough	Telemetry DP	EMR 6130
March 1976	Environment	Croydon	Construction design and research	CTL Modular 1
April 1976	Defence (Army)	Blandford	Computer training and research	DEC KI10
May 1976	Defence (PE)	Farnborough	Control of response tests	Varian V72
May 1976	DHSS	London	Computer-aided design, development in health buildings	Ferranti Argus 700E
May 1976	Defence (Air)	Locking	Training	2 × Prime 300

May 1976	Defence (PE)	Malvern	Analysis of research data	CTL Modular 1
May 1976	Defence (PE)	Harefield	Data analysis	HP 21MX
May 1976	Defence (PE)	Pyestock	General scientific research	ICL 1904S
May 1976	Defence (PE)	Pyestock	General scientific research	DEC PDP 11/40
May 1976	Home Office	Horley	Allocation of frequencies for mobile and private radios	CDC 17
June 1976	Defence (Air)	Cranwell	General scientific and training	DEC 2040
June 1976	Defence (PE)	Aberporth	Data analysis	DEC PDP 15
August 1976	Defence (PE)	Farnborough	Computer-aided design	DEC PDP 11/34
August 1976	Defence (PE)	Farnborough	Research data analysis	DEC GT44
September 1976	Defence (Navy)	Manadon	Speech processing and digital filtering	DEC PDP 11/10
September 1976	Defence (Air)	Locking	Electronics training	DEC PDP 11/45
October 1976	Environment	Garston	General scientific	ICL 1904S
December 1976	Industry	Teddington	Editing	DEC PDP 11/40
December 1976	MAFF	Tolworth	Mass spectrometry	AEI DS50
December 1976	Defence (Navy)	Taunton	General scientific research	ICL 1903S
1976	Defence (Navy)	Portland	Data analysis	CTL Modular I
1976	Defence (Navy)	Taunton	Scientific calculations, chart issue/stock control	ICL 1904S
1976	Defence (PE)	Teddington	Data analysis	Imlac PDS 4
1976	Defence (PE)	Dunfermline	Construction research	Solartron 3366
1976	Defence (PE)	Chertsey	Data logging	DEC PDP 11/35
1976	Defence (PE)	Bedford	Data analysis	DEC PDP 11/10
1976	Defence (PE)	Fort Halstead	Data anlaysis	DEC PDP 11/10
1976	Defence (PE)	Malvern	Analysis research data	DEC PDP 11/40
1976	Defence (PE)	Malvern	Analysis research data	6 × DEC PDP 11/35
1976	Defence (PE)	Farnborough	Data analysis	DEC PDP 11/40
1976	Defence (PE)	Farnborough	General interactive graphics	DEC PDP 11/04
1976	Defence (PE)	Farnborough	Simulation and data logging	DEC GT 42
1976	Defence (PE)	Farnborough	Plant control and data logging	DEC PDP 11/05
1976	Defence (PE)	Farnborough	General research	DEC PDP 11/20
January 1977	Home Office	Stafford	Police command and control system	Ferranti Argus 700E; 2 × 700S
February 1977	Transport	London	Data collection/analysis and other research projects	Prime 300

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
February 1977	Defence (Navy)	Greenwich	Scientific and research training	Prime 400
February 1977	Defence (Army)	Woolwich	Data analysis	HP 2112A
March 1977	Home Office	Sandridge	Scientific applications	DEC PDP 11/34
March 1977	DAFS	Aberdeen	Fisheries research	DEC PDP 11/55
March 1977	Defence (PE)	Bedford	Runway lighting simulation	HIS DDP 716
March 1977	Defence (PE)	Chertsey	Data analysis and control	DG Nova 3/12
March 1977	Defence (PE)	Colchester	Computer-aided design	Prime 300
March 1977	Defence (PE)	Malvern	Research in non-numerical analysis and secretariat	ICL 1906S
March 1977	Transport	Crowthorne	Library and general scientific work	2 × Prime 400
April 1977	Defence (Army)	Feltham	Geodetic computing and processing of mapping data	ICL 1903A
June 1977	Defence (Army)	Arborfield	General scientific computing	DG Nova 3/12
June 1977	Defence (PE)	Chertsey	Analysis of trials	DEC PDP 11/34
July 1977	Defence (PE)	Porton	General scientific usage	DEC PDP 11/34
September 1977	Industry	Warren Spring	General scientific computing	ICL 1902T
October 1977	Industry	Teddington	Numerical analysis	GEC 4070
October 1977	CSD	London	Microprocessor workshop	DEC 11/34AB
October 1977	Home Office	London	Fingerprint system	Prime 500
October 1977	Defence (Navy)	Haslar	Hydro-dynamic research	Prime 550
November 1977	CSD	London	Teaching system programming for British Computer Society courses	DEC PDP 11/34
December 1977	Industry	Cambridge	Design research	DG Nova 3/12
1977	Defence (Army)	Sandhurst	Training	ICL 4130
1977	Defence (Army)	Shrivenham	Training and research	Interdata 8/32
1977	Defence (Army)	Catterick	CAMOL evaluation	ICL 2903
1977	Defence (PE)	Teddington	Real-time analysis	HP 5451B
1977	Defence (PE)	Cobham	Data analysis	DEC PDP 11/05
1977	Defence (PE)	Aberporth	Data analysis	ABS Multibus
1977	Defence (PE)	Fort Halstead	Simulation	DG Nova 3D
1977	Defence (PE)	Malvern	General research	DEC PDP 11/34

1977	Defence (PE)	Waltham Abbey	General scientific data	HP 1000/31
1977	Defence (PE)	Farnborough	System research	DEC PDP 11/55
January 1978	Industry	Teddington	Acoustics research	Prime 300
January 1978	Defence (Navy)	Alverstoke	Data analysis	Varian V76
February 1978	Defence (Navy)	Greenwich	Remote simulation displays	EAL 3200-3
February 1978	Defence (Navy)	Alverstoke	Environmental medicine unit	DG Eclipse S230
February 1978	Defence (Navy)	Manadon	Computer-aided design	Ferranti FM 1600D
March 1978	HO and Met. Pol.	Sandridge	Portable traffic data collection	DEC PDP 11/03
March 1978	Defence (PE)	Farnborough	General scientific computing	DG Eclipse S230
March 1978	Defence (PE)	Porton Down	General scientific computing	SEL 32/35
March 1978	Industry	Cambridge	Design research	DEC PDP 11/20
March 1978	Industry	Cambridge	Design research	Prime 400
March 1978	DAFS	Marine Laboratory 'Explorer'	Fishery research	DEC PDP 11/34
March 1978	Defence (Air)	Bracknell	Training and research	ICL 2903
March 1978	Home Office	London	Development of command and control systems	GEC 40/70
March 1978	Environment	Borehamwood	Transferring work to 1904S at Garston	RC 3600 RJE
April 1978	Environment	Garston	Information retrieval, interactive graphia	2 × Prime 550
May 1978	Defence (Air)	Upavon	Stores, logistical deployment	ICL 2903
June 1978	Defence (PE)	Fort Halstead	General scientific computing	Varian 77-200
June 1978	Defence (PE)	Chertsey	Scientific project control	Digico 1603
June 1978	Defence (PE)	Farnborough	General scientific computing	ICL 7903
August 1978	HO and Met. Pol.	Sandridge	Voice recognition	DEC PDP 11/60
August 1978	Industry	Teddington	Numerical analysis	2 × GEC 40/70
October 1978	Industry	Cambridge	Developing software for computer-aided design	DEC PDP 11/34A
October 1978	Environment	Wallingford	General scientific computing	DEC PDP 11/34
October 1978	Defence (Air)	Cosford	Technical training	Prime 300
November 1978	Defence (PE)	London	Data analysis	SEL 32/35
December 1978	Defence (PE)	Farnborough	Graphics	DEC PDP 11/34
December 1978	Defence (Navy)	Teddington	Scientific research	ICL 2970

ACCEPTANCE DATE	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
January 1979	Defence (PE)	Farnborough	Graphics	DEC PDP 11/34
January 1979	Defence (PE)	Bedford	Flight systems work	HIA Level 6 Model 43
February 1979	Defence (PE)	Farnborough	Simulation work	Prime 300
February 1979	Defence (Army)	Shrivenham	Scientific research	DEC PDP 11/60
March 1979	MAFF	Ardingley	Scientific research	DG Nova 3/12
March 1979	Defence (PE)	Portland	Finite element analysis	DEC PDP 11/34; VAX 11/780
March 1979	Environment	Wallingford	Data concentrators	DEC PDP 11/04 × 2
March 1979	Home Office	Birmingham	Micro probe analysis	DEC PDP 11/03
March 1979	Industry	Stevenage	Scientific calculations	HP Minicomputer
April 1979	Defence (Army)	Blandford	Operation real-time training	Ferranti Argus 700
April 1979	Home Office	London	Audio laboratory	DEC Minic 11
April 1979	Defence (PE)	Aldermaston	General scientific computing	Cray 1A
May 1979	Defence (PE)	Farnborough	Analysis of weather information	SEL 32/75
May 1979	Defence (PE)	Chertsey	Graphic design work	Imlac PDS 4-8 PDS 4
July 1979	Defence (PE)	Bedford	Flight systems work	HIS level 6 Model 43
July 1979	HO and Met. Pol.	Stafford	Police command and control system	Ferranti Argus 700
August 1979	HO and Met. Pol.	Sandridge	PSDB development	DEC PDP 11/34
October 1979	Defence (Army)	Chatham	Training	HP 1000-45
November 1979	F & CO/ODA	Slough	Map plotting	HP 9845B
November 1979	Defence (PE)	Enfield	Preparation of payroll, design and development	ICL 2904
December 1979	Defence (Navy)	Fleetlands	Finite element analysis	DEC PDP 11/60
December 1979	Defence (PE)	Farnborough	Graphics work	Tektronix 4014-1
December 1979	Defence (PE)	Farnborough	Network testing	DEC PDP 11/60
December 1979	Defence (Air)	Halton	Pathology analysis	Wang 2200 VP-4
December 1979	Industry	Teddington	General ADP	ICL 2972

2B Computers for scientific and technical purposes on order as at 1st January 1980

DATE OF ORDER	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
February 1979	Home Office	London	Scientific applications	DEC PDP 11/34
February 1979	Defence (PE)	Farnborough	Graphics work	Imlac PDS 4
June 1979	Defence (Air)	Bracknell	Processing of satellite data images	DEC PDP 11/60
July 1979	Defence (PE)	Farnborough	Analysis of data	HP 1000
August 1979	Defence (Air)	Farnborough	Real-time control	Harris Series 5000
September 1979	Defence (Central)	West Byfleet	Bureau machine	ICL 2970
September 1979	Defence (Air)	Bracknell	Outstation automation	Dual DEC PDP 11/60
September 1979	Defence (Navy)	Fareham	Training of artificers	Prime 550
October 1979	Defence (PE)	Farnborough	Engineering and scientific research	DEC VAX
October 1979	Defence (PE)	Farnborough	Research and development work	Prime 750
October 1979	Home Office	Aldermaston	Forensic science	Prime 550
November 1979	Defence (PE)	Pyestock	Stress analysis	DEC VAX
November 1979	Defence (Air)	Bracknell	Number crunching	CD Cyber 203E
November 1979	Defence (Army)	Woolwich	Stores and production control	CTL 8046
November 1979	Defence (Army)	Donnington	Stores and production control	CTL 8046
November 1979	Industry	Teddington	Protocol research/development	GEC Minicomputer system
November 1979	Defence (Navy)	Manadon	Data logging	DEC PDP 11/34
December 1979	Defence (PE)	Portsdown	Computer-aided design	DEC VAX 11/780
December 1979	Defence (PE)	Bedford	Research and development work	Prime 650
December 1979	Forestry Commission	Farnham	Forestry research	Prime 400
December 1979	Defence (Navy)	Bath	Computer-aided ship design	DEC PDP 11/34
December 1979	Defence (Army)	Blandford	To dual existing machine	HP 3000

Key to Abbreviations Used

[1]Departments (Column 2)

CSD	Civil Service Department
DAFS	Department of Agriculture and Fisheries for Scotland
Defence (PE)	Ministry of Defence (Procurement Executive)
DES	Department of Education and Science
DHSS	Department of Health and Social Security
ECGD	Export Credits Guarantee Department
F & CO.	Foreign and Commonwealth Office
GAD	Government Actuary's Department
GRO (Scotland)	General Registry Office (Scotland)
HO and Met. Pol.	Home Office and Metropolitan Police
MAFF	Ministry of Agriculture, Fisheries and Food
MSC	Manpower Services Commission
ODM	Ministry of Overseas Development
OPCS	Office of Population Censuses and Surveys
PGO	Paymaster General's Office
PWLB	Public Works Loan Board

[2]Manufacturers (Column 5)

ABS	Allied Business Systems Ltd.
AEI	GEC Computers Ltd.
Arcturus	Arcturus Electronics Ltd.
BC(S)L	Business Computers (Systems) Ltd.
Burroughs	Burroughs Machines Ltd.
CDC	Control Data Corporation
CMC	Computer Machinery Co. Ltd.
Comp. Auto.	CAI Ltd. (Computer Automation)
Cray	Cray Research (UK) Ltd.
CTL	Computer Technology Ltd.
Datagraph	Datagraphix Ltd.
DEC	Digital Equipment Co. (UK) Ltd.
DG	Data General Corporation
Digico	Digico Ltd.
EAL	Electronic Associates Ltd.
Elliott	GEC Computers Ltd.
Ferranti	Ferranti Ltd.
GA	General Automation Ltd.
GEC	GEC Computers Ltd.
Grafix	International Information Graphics Ltd.
Harris	Harris Systems
HIS	Honeywell Information Systems Ltd.
Honeywell	Honeywell Information Systems Ltd.
HP	Hewlett Packard Ltd.
IBM	International Business Machines (UK) Ltd.
ICL	International Computers Ltd.

Imlac	Imlac International Ltd.
Interdata	Interdata Corporation
MBM	Midlands Business Machines Ltd.
MCS	Modular Computer Systems Ltd.
Memec or MCZ	Memec Systems
NCR	National Cash Register Co. Ltd.
Olivetti	British Olivetti Co. Ltd.
Perkin Elmer	Perkin Elmer Data Systems
Prime	Prime Computers (UK) Ltd.
RC	Regnecentralen Ltd.
Redifon	Redifon Computers Ltd.
RX	Rank Xerox Ltd.
SEL	Systems Engineering Laboratories Computers Ltd.
Solartron	The Solartron Electronics Group Ltd.
Tektronix	Tektronix (UK) Ltd.
Texas	Texas Instruments Ltd.
Univac	Sperry Rand Ltd. (Univac Division)
Varian	Varian Associates
Ventek	Ventek Ltd.
Wang	Wang Electronics Ltd.

HER MAJESTY'S STATIONERY OFFICE

Government Bookshops

49 High Holborn, London WC1V 6HB
13a Castle Street, Edinburgh EH2 3AR
41 The Hayes, Cardiff CF1 1JW
Brazennose Street, Manchester M60 8AS
Southey House, Wine Street, Bristol BS1 2BQ
258 Broad Street, Birmingham B1 2HE
80 Chichester Street, Belfast BT1 4JY

Government Publications are also available through booksellers

80p net
(Annual subscription including postage £3.91)

ISBN 0 11 722075 2
ISSN 0307-8558